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The Society's Conference and What It Indicates for the Future*

Iago Galdston, M.D.

"YOU can't cure the eye without healing the head, nor the head without healing the body," quotes Dr. Galdston in summing up his discussion of the papers presented during the Society's biennial conference.

TO DO full justice to the title assigned me, I would need to be possessed of an encyclopedic intelligence and of the competence of a prophet. Palpably, I qualify in neither regard. If however, the burning of midnight electricity and the stubborn application to the stack of papers you see before me—a stack which includes all but one of those delivered at this conference—are any warrant at all, then I am in small degree entitled to present a summary of the transactions of this conference. This I do in the spirit of the late Heywood Broun, who headed his column, "It Seems to Me."

May I begin my summary and review by touching on something which, because it is very obvious, is most likely to be overlooked? This very splendid conference—and I say splendid with full appreciation of its connotations and with a full sense of propriety of applying that term to this conference—is, I beg you to note, conducted by the National Society for the Prevention of Blindness, a Society with a splendid history, a Society which in origin and function is, and I hope will remain, a voluntary organization.

We have gathered here, without distinction, prejudice, or awe, representatives from universities; foundations; medical schools; medical societies; local, state, and federal health departments;

* Presented at the Biennial Conference of the National Society for the Prevention of Blindness, December 6, 1941. The papers mentioned in this discussion will be available in printed form.

social work organizations; teachers; and industrial groups. These representative elements have commingled both in the audience and on the program in a precious and smooth way. They have all come together to contribute their knowledge and their experience that there might be brighter light and better vision in this world.

In bringing this obvious matter to your attention I have, of course, a motive which I will confess to you at once. My motive is to use this "dissertation on the obvious" as a springboard from which to plunge directly into the substance of the first paper delivered to this conference. This was the contribution of Professor John W. McConnell, a paper which has a long title but which on the program was intelligently bobbed so that it read "Legal Authorizations." Professor McConnell's paper was scholarly, studied, and labored. I desire to call your attention to two fundamental considerations, more implied than expressed by the author. These considerations are as follows: one, that it is up to the government to do a job; and the other, that there should be, and here I quote from the paper, "legal authorization for positive action." Both of these deserve careful and critical reflection.

Since we have acquired the habit of combining the alphabet in all sorts of hieroglyphic designations of governmental agencies, there seems to have developed a universal inclination to take it for granted that "it is the government's *obligation* to do." Because of the tension of the times there seems to be a psychological regression, a tendency to fall back from the adult attitude of self-reliance to a state of dependency upon the Father. As a corollary to this stands the second item, the state of anxiety or impatience which calls for "legal authorization for positive action." This is no more than a devious way of saying, "You will either do it according to the law, or by 'yumpin' yimminy!' "

Now, I confess to you that I feel strongly about these tendencies, for I see that, if they are permitted to expand beyond the limits of historic reasonableness and sober reality, they menace just such splendid institutions as the one under whose auspices we have foregathered during the past three or four days. During the last decade we have suffered what was once beautifully described by Murray Gilbert, in writing of the decline of Greek civilization, as a *loss of nerve.* It seems to me that, notably in the field of health

education, there has been experienced a loss of nerve, a loss of faith, a loss of confidence in the competence of individuals, collectively and on a voluntary basis, to do the things which they know need to be done. We seem to be looking to some bewhiskered nonexisting entity called "Popper" to do those things for us under the injunctions of law.

Would you have me tell you which of the sessions of this conference I consider to have been the most illuminating? It was the dinner given in honor of Mr. Carris. Why? Because, as Mr. Carris himself said after he was laden with compliments, he stood there as a symbol in part of the past, of the men and women who had the vision and the courage and hope and self-confidence to initiate and carry on the work of the Society. He stood there also as a symbol of the future, for, as he looked about him, he saw those who, with like courage and like vision and like enthusiasm were ready to carry on. I say that to me *that* was one of the most impressive of the sessions because it embodied and expressed the spirit which made our civilization—the spirit which has engendered and guided our democracy, the spirit to which we pay tribute when we sing our national anthem.

I recall in this connection two of the greatest speeches known in the history of mankind, speeches that are the quintessence of that which we prize. One was delivered by Pericles, more than two thousand years ago, over the dead of Athens. The other was Lincoln's Gettysburg Address. Two thousand or more years passed between the deliverance of those speeches, but the spirit is the same. And in both instances, at crucial times in mankind's history, men of keen intelligence stood forth and said, "It is ours to dedicate ourselves to a task for which the best of men have lived and died." Both Pericles and Lincoln said, not "It is the government's," but "ours"—the task.

It is interesting that in the other papers of the program the consistent emphasis was not on the need for "legal authorization," but rather on the urgent need fully to utilize and apply the information and vast knowledge, the established techniques and proved methods for the prevention of blindness and conservation of sight. Take, for instance, the papers of Dr. Schoenberg and Dr. Sullivan. Both of them dealt with glaucoma. The control of this disorder, its

early diagnosis and its medicinal and surgical treatment, are well known to us, yet 10 per cent of all blindness is still caused by glaucoma. One hundred thousand people are partially blinded by it. Do you believe that the passage of any new law or the enactment of any compelling act would serve to improve these conditions? I doubt it. What we need here, as elsewhere, is more intensive education.

I think it were well for us to remember that life is not in its ways logical, but rather psychological. I call in witness this interesting and rather amusing point. Mr. Hayes, in his paper, "Restoration of Sight and Prevention of Blindness in Adults," described the excellent work that has been developed in Kansas. When he reported upon the results of his work, he expressed himself in the following terms: such-and-such a percentage of those who received treatment were "rendered ineligible for aid to the blind." There you have an example of "human psychology." Fancy, for comparison, an orthopedist reporting on the effectiveness of his work in terms of "individuals now rendered ineligible to use crutches," instead of "able to walk, able to move, able to work, able to earn a living."

Another illustration of how much more we need education than legal compulsion was given in the paper, "Eye Protection in the Defense Industries," by Mr. Haller. How stirring it is to hear the achievements of prevention of accidents and of injuries to the eyes in industry! Think of a workplace in which 90 per cent, nay, even 98 per cent, of all eye injuries have been eliminated. And yet this is but an isolated achievement, for we are told that preventable accidents and eye injuries in industry cost the equivalent of 110 million dollars annually. We are prompted to ask, "Why are these not prevented?" Whatever the answer may be, we know that a maximum of education and a modicum of laws are required to persuade all the persons concerned, from the man who has a say-so to the man who wears the goggles.

Consider again by way of illustration the very fine paper read by Miss Matie Carter, a paper which contains an earnest lesson salted with humor. I feel sure Miss Carter must be a fine cook! Miss Carter discussed "Medical and Educational Provisions for Partially Seeing Children in Rural Districts." You remember she told us of the case of the mother who insisted that her daughter saw

well enough and didn't need any clinic help, even though within a year the daughter lost the vision of one eye. That mother probably didn't tell all of her feelings. I expect that she possibly recalled the rhyme, "Gentlemen never make passes at girls who wear glasses." Again you must recall a story told by Miss Carter of the teacher who wouldn't move the fifth grade boy with defective vision to a seat nearer the window because that was, as she told it, a sixth grade seat. In these two tales we have the quintessence of the matter. Life and people are not logical. They are, to use a vulgarism, psychological.

Let me not, however, overdrive the point. I am not pleading for a state of idealistic anarchism. Perhaps in a few millennia, if humanity doesn't meanwhile destroy itself, our beings may be sufficiently wise and human to do without laws. Today we no doubt require legal sanctions. We can perhaps crystallize our thoughts on this score by affirming that it is the obligation of the civil community, by law or otherwise, to make it possible for the individual to help himself. Where, however, civil government goes beyond this and does for the individual that which the individual should do for himself, neither the interests of the group nor those of the individual are best served.

One other item deserves consideration in this connection. We have from the Latin the injunction, *Caveat emptor*, let the buyer beware! This is valid if the buyer can really beware. If a woman, however, goes into a drug store, buys a hair dye, the contents of which are described in a bastard admixture of Latin and Greek, and if that hair dye contains a noxious substance which may produce a skin inflammation or injure the eye, then she cannot be expected to "beware." It is the government's obligation to safeguard the individual under such circumstances.

May I now turn to two other papers which interested me very much? I refer to the papers by Dr. Schweitzer and Dr. Baumgartner, which dealt with hereditary and prenatal factors causing blindness. In this connection I should like to report to you that only a short time ago I wrote to a half-dozen ophthalmologists in an effort to discover what they knew or thought of the hereditary aspects of blindness. Five of the six responded by saying that they knew nothing about it and didn't think that there was much to be

known. And yet here are two fine papers defining the nature of the problem and indicating the lines along which research and study might be conducted. Of course, when we refer to heredity we must recall that touching definition of heredity, namely, that it is that science which enables us to blame our parents for our own faults. There is much to this definition, for I have found that frequently when a condition is charged to hereditary influences, such designation is only an excuse for not pursuing further a difficult problem.

The papers of Dr. Schweitzer and Dr. Baumgartner were modest and conservative, but some of the discussion that followed tended in part to fly beyond the bounds of reasonableness.

There is in my humble opinion a little too much glib bandying of the term, sterilization. My own feeling is that, save in one or two conditions, such as amaurotic idiocy, we have little warrant for recommending sterilization. I know that the geneticists have done an enormous amount of work with fruit flies and lower animals; but all this work is a far cry from the sterilization of human beings for the prevention of the so-called hereditary diseases. Genetics in the strict sense means germ plasm, and when you speak of germ plasm there is implied a fatal finality. Germ plasm has that about it. As the high school boy said, "Heredity is that about which you can do nothing." But in the so-called hereditary diseases we as yet do not know where the effects of germ plasm end and those of environmental influences begin. Of environmental influences we have in mind the prenatal as well as the postnatal. Until we know more about these matters, let us suspend all talk about sterilization.

I won't elaborate further on the papers of Dr. Schweitzer and Dr. Baumgartner, save to offer congratulations to the speakers for their presentations and to this conference for its foresight and good fortune in obtaining such excellent contributions.

I must now touch briefly on Mr. Hayes' paper, offering my apologies for the fun I poked at the "ineligible for aid to the blind" phrase. Mr. Hayes' recitation was an excellent lesson in how to do things right. Mr. Hayes told us how, in the State of Kansas, they have effectively brought together the medical and welfare organizations in a co-ordinated program. In this state they have gained a willing and happy participation of the medical profession by

bringing the medical men in at the very inception of the program. I commend this paper to you as an illustration of how the co-operation of the medical profession is to be obtained.

Having promised to limit myself to thirty minutes, I now find myself obliged to skip quickly over certain of the other papers delivered here—those, for example, of Dr. Gradle and of Mr. Haller. These papers have dealt with eye conservation and defense. I have but one tangential observation to make: gearing things up to defense has its value, but also its hazards. "Defense" smatters a little too much of the Maginot line. We want to work, not only for defense, but for the day after tomorrow—for in the focusing of excessive emphasis upon defense we may lose sight of some of the things for which we are fighting.

Now I come to my last point, one which is dedicated to the future. The history of all voluntary health organizations has a common pattern. A group of enthusiasts, inspired by an idea and possessed with a vision, dedicate themselves to the achievement of something which they feel deserves their devotion. In the natural funneling of energy and purpose of this group is to be found the strength of the pioneers, the initiators, the enthusiasts. While this pattern is most precious at the initiation of the movement, it becomes, as time passes and as the movement prospers, a menace. That menace is *provincialism*, a "nearness of vision," a parochialism in purpose. This is true of all movements, whether they be devoted to cancer, tuberculosis, deafness, blindness, and so forth. Provincialism is essential in their initiation, but beyond that it is cosmopolitanism that promises effectiveness. As we face the future, we must bear this in mind.

It is here that I should like to refer to a paper presented by Dr. Boudreau. How stimulating it was to hear him recite the bearing of nutrition upon eye conditions! That paper was, if you please, an argument for cosmopolitanism. It presented in modern terms the lesson which Plato put in the mouth of Socrates: "You can't cure the eye without healing the head, nor the head without healing the body." We have been urged that those of us dealing with problems of the eye must bear in mind that the eye is set in a human being, that the human being is set in his environment, that the environment is a segment of this complex universe. We can no

more isolate "eye problems" than one can untangle the middle knot of a fisherman's net.

Let me translate this into concrete terms. How many of those who are now occupied with the programs in aid of those with defective vision actually concern themselves with the nutritional state of their clients? How many of those who are interested in vocational re-education appreciate the psychological implications of turning a worker from one occupation to another? With these questions I now turn to summarize my own summary, and this I do in terms of two P's. I beg you to beware of Paternalism carried to the extreme. I beg you to beware of Provincialism carried to the extreme.

Sight Conservation on the Advancing Fronts of Public Health and Nutrition

Frank G. Boudreau, M.D.

DR. BOUDREAU challenges us with the thought that "nutrition may prove to be one of the keys needed to unlock some of the mysteries of eye diseases and conditions which long have baffled us."

MODERN public health work resembles a war of movement. The front is fluid, ever changing. Very often the nature and extent of these changes are not fully appreciated at army headquarters. Hence the war on any particular front may be directed from headquarters, without much reference to the actual situation or to the changes which have occurred or are occurring.

The front of public health is changing because of influences brought to bear on it from various directions. It is influenced by the age distribution of the population with which it has to deal. If that population is largely composed of children, the chief public health problems will be those relating to diseases and conditions peculiar to childhood. If, on the other hand, the population is largely made up of old people, the chief public health problems will be those relating to longevity and senility. These are two wholly unnatural illustrations; no population is biased so strongly in one direction or another. But it is true that significant changes are taking place in the age distribution of the population, and when present trends are projected into the future, drastic changes are anticipated. For one thing we are approaching the period when our population may become stationary. Soon there will be no increase between census periods. It is possible that this failure to increase will be followed by an actual decline. Both a stationary and a declining population would be new to this country, which has been geared to an expanding population, an expanding econ-

omy. But the shock, when it arrives, may not be too great, for the slowing down of the rate of growth is now easily perceptible and we may become accustomed to its effects before growth definitely stops.

We may also become accustomed to marked changes in the age distribution of the population. Some authorities predict that by 1980 the number of persons over 65 years of age will have doubled, while the number under 19 years of age will be halved by that time. Fortunately, the number in the age group 20–64 is not expected to alter very much. What does changing age distribution mean in terms of public health? According to Mr. George St. J. Perrott of the United States Public Health Service: "If we assume no progress in prevention and control, the various causes of ill health will assume different relative importance in years to come, some increasing and some decreasing. For example, by 1980 an increase of 76 per cent may be expected in the total days of disability due to the cardiovascular-renal diseases, 15 per cent in digestive diseases, 15 per cent in disability due to rheumatism and 22 per cent in accidents; on the other hand, disability due to the acute communicable diseases will decrease by 25 per cent even if no further progress is made toward their control."[1]

I must speak of still one more trend in population change. Corrected birth rates indicate that our urban populations, especially in the larger cities, are not reproducing at a sufficient rate to replace themselves, while rural rates of reproduction are far above the replacement level. In all regions of the country high rates of reproduction are associated with low planes of living. The greatest surplus of births comes from regions where public health and educational machinery is least developed. Has this fact anything to do with the medical findings of selective service boards?

Another influence brought to bear on the changing front of health is change in the leading causes of deaths and illness. Decreases[2] in the importance of leading causes of death between 1911 and 1929 are as follows: typhoid and paratyphoid fever, 92 per cent; malaria, 91 per cent; smallpox, 75 per cent; measles, 78 per cent; scarlet fever, 82 per cent; respiratory and acute disseminated forms of tuberculosis, 50 per cent; other forms of tuberculosis, 65 per cent; bronchitis and bronchopneumonia, 33 per cent; diarrhea

and enteritis, 83 per cent; cirrhosis of the liver, 38 per cent. Some of the increases are cancer and other malignant tumors, 47 per cent; diabetes mellitus, 44 per cent; diseases of the heart, 54 per cent; appendicitis and typhlitis, 43 per cent; homicide, 15 per cent; automobile accidents, 1,344 per cent.

Faced with these changes on the enemy front, it will be necessary drastically to revise the plan of attack if success is to be achieved. Expectation of life at different ages must be taken into consideration in connection with the changing age distribution in our population and the increase in mortality and morbidity from disease to which the adult is most prone. Comparing Massachusetts life tables of 1789 with those of 1929 reveals an enormous increase in expectancy of life at birth—from 35 years to over 60.[3] Marked increases in life expectancy have occurred only in the younger ages, however. As far as middle and old age is concerned, there has been no consistent increase and some decreases have occurred.

The growing liberality of man's conception of his duty towards his fellow man is exerting strong pressure on the public health front. This has been greatly influenced in recent months by the new methods of war and of defense. Sociologists have always recognized that extremes of poverty and affluence are apt to set up stresses and strains which may end by wrecking society. It remained for the German army to make use of this theory in the most practical way. The houses of the workers and of the poor were deliberately bombed, while for a time the dwellings of the upper classes were spared, and German propaganda made sure that the lesson would not be lost. But the poor stood up with unexpected courage and determination. It is said that attendance of workers in factories which are in danger of bombing is more faithful than in factories away from the front of danger.

This new kind of war seeks out every weakness in a society; it is no wonder that means should be sought for strengthening the weaker elements. Better housing, better medical care, and improved sanitation have been quickly followed by free or cheap milk in the schools and clinics, by more equal distribution of protective foods to all classes, by special provision of meals for workers in defense industries.*

* These remarks apply to Great Britain.

It is not a coincidence that evidence of the great disparity between sickness and death rates among different income classes has been accumulating rapidly in recent years. Among wage earners, the average number of days of disability from illness declines with increasing income; it is nearly nine days among workers earning less than $1,200 a year and not quite four among those who earn $3,000 or over.[4] The infant mortality rate in Denver, in 1930, was 160 among families earning less than $500, while among families earning $3,000 or over it was 30.[5] In Cleveland, in 1928, infant death rates were 88 in the poorer and 40 in the better residential districts.[6] My distinguished predecessor, the late Edgar Sydenstricker, summed up the evidence in these words:

> A definite inverse association between the amount of income and the incidence of sickness and death is clearly shown by a considerable body of evidence. If income or economic status were determined entirely by inherited constitutional strength, by innate vitality, then we should be limited to the conclusion that these differential rates of sickness and death were entirely due to these differences in heredity. But we know that heredity alone does not select which persons are to be in one economic class or another; although undoubtedly it plays a part; on the contrary economic status is itself determined largely by environment.

The development of new weapons of offense constitutes a major influence in determining the changing front of health. The use of sulfanilamide and its derivatives made possible a tremendous advance in the pneumonia sector; I understand that it is playing an important part in the eradication of trachoma. But new weapons are now being forged which will enable the whole front to advance all along the line on an unprecedented scale. These new weapons are being furnished by the developing science of nutrition; some of them have been used in an experimental way—on a small scale; the results have been astonishingly good. Let me cite two examples:

First Example.—A study has just been published in the *Journal of Nutrition*[7] bearing on the influence of prenatal diet on the mother and child. Two hundred and ten pregnant women in approximately the fourth month of pregnancy were selected on the basis of a study of their diets. These diets were very poor, being deficient in calories as well as in the more important specific nutrients. An

attempt was made to supplement the diet of every second one of these women so that it would be satisfactory by modern standards. To achieve this purpose these women received a daily supplement of one egg, one pint of milk, one orange, one ounce of cheese, four and a half ounces of tomato juice, half an ounce of wheat germ and some iron. Here then were two comparable groups of pregnant women; almost exactly comparable except that 90 of them received a satisfactory diet from the fourth month of pregnancy to the end of labor, and 120 of them continued to consume the poor diet they had been accustomed to using. In the poor diet group 6 per cent had miscarriages; 8 per cent, premature births; and 3.4 per cent stillbirths. In the supplemented group there were no miscarriages, no stillbirths, and only 2.2 per cent of premature births. This means that there were no deaths among the offspring of the 90 women whose diet had been supplemented, while there were 14 deaths among the offspring of the women who continued to receive the poor diet. Duration of labor, complications of pregnancy, psychological state of the mother, health of the offspring—all of these were so much better in the group of mothers whose diet had been supplemented that no one was left in doubt as to the part played in pregnancy by better nutrition.

Second Example.—Some time before the present war the British Army authorities were alarmed at the large percentage of would-be recruits who were rejected on medical examination. This was over 50 per cent in 1934, nearly 45 per cent in 1935, and nearly 60 per cent among those volunteering for the air force. Parenthetically, these percentages of rejections are not to be compared with rejections in our own selective service examinations, for the former were volunteers and only presumably fit men would volunteer, while the halt, the maim, and the blind must appear before the draft boards.

About a thousand of these rejectees in England were sent to a physical development depot at Canterbury, where they were given ample food (five meals a day), long hours of quiet sleep, hard physical work, and healthful recreation. At the end of about six months these men were asked if they still wanted to volunteer for the Army. Nearly all of them did, and they were sent to recruiting offices where they were not previously known. As a result of their conditioning at the Canterbury depot, 86 per cent of 834 young men (who had been rejected) were now accepted for army service and passed on to regimental depots.[8]

The whole new science of nutrition has developed during the last 35 or 40 years. We have not even begun to apply it. When we do

make a serious attempt to apply for human benefit this new knowledge of bodily chemistry, we shall be ushering in a new era of public health. I believe that the results will be just as important as the contributions made to the cause of public health by the discoveries of Pasteur and his associates.

Biochemists and physiologists have worked out the rôle of many of the vitamins and minerals in human metabolism. I learned in medical school that the body required for its functioning fats, carbohydrates, and proteins, plus a few accessory substances. The list of essential nutrients has now reached at least 37, consisting of 6 or more vitamins, 11 minerals, 18 amino-acids, a separate source of glucose and linoleic acid. Not only do we know that these nutrients are essential, but we know approximately in what amounts and proportions they must exist in a diet adequate for health. Hence there is general agreement, not only in this country but all over the world, wherever men have delved deeply into the science of nutrition, on the amounts of the different nutrients required for a satisfactory diet.

The first generally accepted statement of dietary requirements was prepared by twelve experts from different countries who came to Geneva in 1935 at the call of the League of Nations, and took only three days to reach full agreement.[9] But as the science of nutrition advances, these requirements need revision, and today the League is not in a position to convene committees at Geneva. So the task has been taken over by the Food and Nutrition Board of the National Research Council in Washington. By its standards, which are known as dietary allowances, a large proportion of the people in this country fail to obtain diets adequate for health. The greatest difficulty occurs among the lowest income groups which are also subject to the highest morbidity and mortality rates. As income rises more of the protective foods needed for health are purchased; as income declines, smaller and smaller amounts of these foods are obtained.

In any given income group there are families which buy wisely and others which buy foolishly; this is the field for education in diet. By these standards nearly 50 per cent of the population in Great Britain before the war did not have diets adequate for health. The diets of more than a third of our own people are

deficient by the yardstick of the Food and Nutrition Board of the National Research Council. Improvements in health to be expected by raising inadequate diets to a satisfactory level are illustrated by the results of giving extra milk to school children. Growth is accelerated, cheeks become redder, and spirits more boisterous in comparison to similar groups who do not receive the supplement.

The great problem as regards nutrition is to select out of the population those who are suffering mildly from nutritional deficiencies. It is not difficult to diagnose cases of gross deficiency; these are the easily recognizable scurvy, rickets, beriberi, xerophthalmia, nutritional edema, nutritional anemia, pellagra, etc. But for every fully developed case of one of these deficiency diseases there must be hundreds, yes, thousands, whose deficiency is so mild that it shows no readily recognizable symptoms. Little progress will be made in the conquest of malnutrition until we know exactly where, when, and to what extent it is prevailing.

In this as in every other public health problem precise definition is the first requirement. Little light is thrown on the existence of specific nutritional deficiencies in the mild or latent stage by the measures usually adopted to appraise nutrition—height, weight, and other anthropometric measurements. The tests must be more delicate and specific: chemical determinations of fasting blood levels of different nutrients, such as blood-plasma ascorbic acid; rapidity of excretion of test doses; tests of capillary fragility; best of all, observation with the naked eye or the biomicroscope of early pathologic changes caused by the deficiency. This is the method of detecting at an early stage the presence of riboflavin deficiency. Into the normally clear cornea minute vessels make their way. These at first may be seen only with the slit lamp. They begin to fade out in a few hours after large doses of riboflavin. The next stage is cloudiness: interstitial keratitis, which may go on to ulceration and opacity. There are other signs of early riboflavin deficiency: cheilosis, a characteristic glossitis, and certain skin lesions. But the keratitis is one of the earliest and most constant.

In the first report of the clinicians who described these signs of early deficiency in riboflavin, two cases of syphilitic interstitial keratitis were included. These resisted antisyphilitic treatment

but cleared up readily with riboflavin. I would like to remind this audience that many workers with laboratory animals have reported the development of cataracts among those animals on a diet deficient in riboflavin, or vitamin G, as it was first called.[10] The rôle of riboflavin deficiency in the development of cataracts has never been fully elucidated, and deserves further study now that the pure substance is so readily obtainable.

Fat-soluble vitamins have long been known to exert a strong influence on the eye. Bitot described characteristic spots in the conjunctiva in 1863, and many of the changes which we now know to be due to a deficiency of vitamin A were accurately observed and recorded even earlier. The slit lamp is of the greatest assistance in detecting the early changes which are thought to precede xerophthalmia, clearly recognized as a sequel to vitamin A deficiency. Large groups are now being subjected to careful study for evidences of riboflavin and vitamin A deficiency, and surprisingly large numbers have been found to show unmistakable signs of such deficiency. Dietary studies have consistently revealed that a great many of our people fail to receive in their diets the amounts of these nutrients which the best authorities consider necessary for health. The observation of large groups for vascular invasion of the cornea and for characteristic changes in the conjunctiva has fully corroborated the results of dietary studies.

In July, 1941, there appeared in the *American Journal of Diseases of Children* an account of 119 cases of follicular conjunctivitis in school children due to vitamin A deficiency.[11] In all cases the diet was deficient in vitamin A or carotene. Prompt improvement and recovery followed the administration of large doses of vitamin A, while in control groups practically no improvement occurred.

I have said nothing of the measurement of vitamin A deficiency by the various devices which have to do with dark adaptation. Night blindness is certainly related to deficiency of vitamin A, but this deficiency is not the only factor involved in the rate at which dark adaptation takes place. Now that so many air pilots are being trained, the subject deserves fuller consideration. Research is urgently needed to assign to the different factors involved its exact rôle in the production of night blindness.

Mutch and Richards, of Aberdeen, produced well-marked ker-

atoconus in rats on a vitamin A deficient diet.[12] In most cases the corneas regained their normal contours after the animals were given vitamin A for a few weeks. Theorizing on the basis of their results the authors point out: keratoconus in European countries is rare; myopia and myopic astigmatism are common; their production may be due to the same mechanism. I mention this work to emphasize the need for new research. The vast amount of new knowledge which we have acquired as a result of advances in the science of nutrition makes it necessary to re-examine our knowledge in every field of medicine. Nutrition may prove to be one of the keys needed to unlock some of the mysteries concerning eye diseases and conditions which long have baffled us. In a few short years light has been thrown by the new science on important and fairly common diseases of the cornea and conjunctiva; possibly it will help to increase our powers of control over myopia and myopic astigmatism.

The greatest influence which is being brought to bear on the public health front is this attempt to push back the frontiers of disease by measures or methods of detecting and correcting early deviations from vigorous health. The chief health problem is no longer the prevention of fully developed disease. Our task is to determine *why* so large a proportion of our people fail to develop and maintain the vigorous health characteristic of selected classes. Translating this task into the responsibilities which will be assumed in future by the National Society for the Prevention of Blindness, I can see your emphasis shifting more and more from prevention to conservation, as indeed it has been doing in the last few years. Conservation of vision in the modern sense of the term will call for talents and energies never needed in the simpler tasks of the past. If past performance is any guide to future accomplishment, I am sure that the National Society will enter upon its new tasks with every prospect of success.

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Eye Defects Discovered Through Selective Service Examinations*

Arno E. Town, M.D.

A PROGRAM of eye health is vital in the schools, in industry, and in adult groups in order to achieve the utmost in national defense, summarizes Dr. Town in analyzing the eye defects discovered through selective service examinations.

THE examination of selectees under the Selective Service Act should provide us with a source for comprehensive studies of our physical defects as a nation, especially in comparison with the defects found in men drafted in 1917–18. Only partial statistics on the recent selectees are available at present, so that no final conclusions can be drawn, but the figures are sufficient to give us a working idea of the completed picture.

From the experience of colleagues and myself working on the Selective Service Boards, eye defects, many of them remedial, are impeding national defense. Recently, Surgeon General Thomas Parran, of the United States Public Health Service, termed it a national disgrace that a large per cent of men otherwise available for service were deferred because of physical defects.

Dr. Roger I. Lee, President of the American College of Physicians, said that certain physical regulations for trainees were "too rigid" and that the large number of deferments for physical defects was no cause for alarm over the health of the country's man power. He continued: "The greatest per cent of physical deferments in Selective Service has been made so far for defective teeth and defective eyesight, regulations for which and the interpretation thereof by draft boards have been over-rigid." He also recently

* Presented at the National Conference of Social Work, June 5, 1941.

declared there has been over-emphasis on the relation of draft medical statistics to the general health of the nation.

The requirements of eyesight by the army and navy are necessarily rigid and many men are kept out of the service who would be valuable and willing soldiers. Comparisons between the current draft statistics and those of the last war are bound to be erroneous because the standards of physical and mental selection are much more rigid today. Furthermore, our present-day methods of diagnosis are superior and the government is seeking to bar potential as well as obvious misfits from the army now in training.

Many physicians believe that some of the reasons for deferment are inconsequential from the practical viewpoint and that men are being rejected who could prove useful in occupations requiring limited physical activity. This is, of course, for the army to decide, but it is safe to say that many of those refused as physically unfit are reasonably healthy by ordinary civilian standards and capable of fulfilling the social and economic demands of normal life.

There has, it is true, been a substantial per cent of rejections because of physical deficiencies which cannot be dismissed as unimportant, and regardless of the efficacy of a health program, it could not banish many congenital deformities and traumatic defects for which reparative procedures have not yet been devised.

A summary of defects among men drafted in the World War of 1917–18, as issued by the U. S. Public Health Service recently, indicated that 21 per cent of the men examined were rejected for any military service and an additional 10 per cent were accepted for limited service only. Corresponding figures for men examined under the Selective Service Act of 1940, indicate that 28 per cent were not qualified for any military service and an additional 15 per cent were qualified for limited service only.* The two sets of figures are only roughly comparable, since there is a difference in the age groups and occasional differences in the definitions of defects. Moreover, it is certain that medical examinations as of 1940 were more exacting.

In the order of their prevalence in the figures for 1940, defects of teeth head the list, 8.32 per cent of the total number examined

* Later analyses of larger numbers show even higher proportions of rejections. This is also true of rejections for eye defects.

being disqualified for full general military service for this cause. It was amazing to find how many young men failed to come up to the minimum requirements and how many had never before had a physical examination. An indirect service was done for them when the poor oral hygiene was called to their attention, and many expressed surprise and desire for corrective measures.

The next largest group was the group who failed to meet the requirements in vision (5.03 per cent did not qualify for general military service, about half of whom were not qualified for any military service whatever). This compares with 5.3 per cent not qualified for general military service among drafted men in 1917–18. In the latter group were many (4 per cent of the total examined) specified merely as having "defective vision," which probably indicates that these defects are to be accounted for by refractive errors. In our own experience with the examination of the present selectees, we found that many of these young men who could not see well enough to become soldiers did not wear glasses. Practically all of them had been driving motor vehicles and many could not be made to understand why they should be rejected as they possessed operators' permits to drive.

Included in the above figures are only those individuals whose dental or eye defects were the primary cause of their disqualification as selectees. In the U. S. Public Health Report summarizing the findings for the 120,689 men in the 1940 group, no figures are available indicating the total prevalence of each type of defect. However, a more detailed study of a group of men examined in New York City (comprising 17,540 men) showed that the entire group of those having eye defects sufficient to disqualify for general military service amounted to 11 per cent of the total examined. The latter figure probably gives a truer picture of the prevalence of uncorrected vision defects in young adult males.

Rejections for insufficient teeth, defective eyesight, and underweight are greatly to be deplored because in many cases the disqualifying fault could have been prevented by public education. More stress on proper nutrition, hygienic use of the eyes and other organs, also, early recourse to medical and dental aid, would do much to improve the general level of health. Selective Service examinations show differences in health in different parts of the

country, a notable example being the poor dental conditions in the New England states as against the good ones on the Pacific Coast. The percentage of rejections in the Dust Bowl as well as in the Goitre Belt is abnormally high, again showing the importance of the nutritional factor.

If, after the draft in 1917–18, a program of sight saving had been instituted, how many more of our young men of today would have been accepted for military training and would have been more fit for the battle of life! The draftees of today were the children of 1918. It behooves us all to set our will and energies to work upon a national campaign for sight conservation.

The most common causes of eye defects discovered by the Selective Service examinations in most states are myopia and myopic astigmatism, and until the cause and prevention of these defects can be determined, the eyes of our youth will be a problem of national defense.* There are several theories as to the causes of myopia: hereditary, nutritional, and unhygienic conditions. Observers in England are commenting on the decrease in the number of pupils with myopia which has been noticed in the last twenty years in the sight-saving classes, formerly called myope classes. This is being attributed to the marked rise in the standard of living in the lower income group. Here, then, is tangible evidence of the nutritional theory of myopia, and in the field of nutrition and hygiene the medical social worker can do great good.

The role that vitamins play in the prevention of refractive errors has not yet been determined, but with our increased knowledge of these dietary aids, we may find a valuable means of increasing our eye health. However, until more is known about vitamins, the public should be warned against their indiscriminate use. The further we go into the field of preventive medicine, the more we realize how much is yet to be done.

Another common preventable defect which has been brought to the attention of those working on the Selective Service Boards is the poor vision in one eye due to squint or cross-eyes. Many of these men have been surgically treated so that the appearance of the eyes is fine, but there has been no after-care or eye exercises,

* In a few states trachoma may still be the most common cause because of lack of treatment facilities for white patients. Detailed reports are not yet available.

which might have prevented the defective vision. Because of this fact, I have seen men rejected from mechanical trades, where their lack of judgment of depth perception is a definite handicap. Here then is an entire field of sight conservation which has been neglected. A follow-up of these case reports should be the endeavor of the social worker, working in association with the surgeon who operated on the cross-eyes. The occurrence of an ensuing amblyopia or loss of vision could be prevented by the organization of an orthoptic, or eye-exercise, clinic. There is a lack of continuity in medical care which should be corrected. We need co-ordinated services which will unite the medical profession and all of the social agencies.

Another cause of rejection is opacities or scars of the cornea of the eye due to previous ulcers. It is now an established medical fact that lack of the vitamin riboflavin (part of the B complex) predisposes to corneal disease and ulcers, resulting in considerable loss of vision. This brings up the question of whether we are doing all we can in the way of prevention of disease, as unquestionably a certain number of these eyes might be saved if they had the proper medical care in conjunction with the correct nutritional factors. In these cases, where general environment is of such value, the co-operation of the medical social worker is essential.

To those who have studied available data on the etiologic factors in the serious affections of the eyes which too often lead to blindness, the figures showing the prevalence among selectees of defects other than eye defects are significant. Defective teeth and diseases of the ear, nose and throat may indicate a possible source of focal infection which, if neglected, would seriously damage the eyes. Certain general systemic diseases, such as cardiovascular disturbances, are likewise important as a possible source of future eye disease. The early discovery and treatment of venereal diseases among this group are also to be commended as prevention of blindness measures.

What should have been done before the huge screening test of the nation's health, constituted by the Selective Service Act, went into effect? What should be done now that we have the information in regard to the defects in the physical condition of our young men? Since 43 per cent of the young men in the country are being dis-

qualified for general military service, it shows that we must do a better job of improving the health of the people.

What is necessary, primarily, are methods of conservation of vision. A program of eye health education is vital in the schools, in industry, in adult groups. Better lighting conditions and safety measures in all industries are essential. Safety campaigns should stress the preventability of eye injuries. The medical profession should continue to seek earnestly a scientific answer to problems of defective vision, eye diseases, and their causes. An improvement in national health will be the greatest contribution to result from this whole defense effort.

The National Society for the Prevention of Blindness has long had a program of adult education in regard to the care of the eyes. Its objectives have been to ascertain, through study and investigation any causes, whether direct or indirect, which may result in blindness or impairment of vision, to advocate measures which would lead to the elimination of such causes, and to disseminate knowledge concerning all matters pertaining to the care and use of the eyes. These objectives have been constantly and seriously followed. Lectures, radio broadcasts, and literature have reached many thousands. The Society is ceaselessly acquainting the public with scientific knowledge relating to cataract, glaucoma, trachoma, myopia, strabismus, hereditary eye conditions, etc. It advocates measures but has no facilities for enforcing them; it influences other agencies to carry on the necessary activities.

Today much is being done in the schools toward maintaining the general health of the pupil. In an ideal program, periodic check-ups are made, and if any disease or impairment in his condition is noted, he is referred to the proper physician for treatment. If the parents are unable to supply the means for such treatment, charitable societies in most communities are glad to offer their help. An intensification of this program in the schools is needed, together with a schedule of eye health studies.

If the physical defects are taken care of early, we could avoid major and minor diseases. There is much we could do to improve the general health of the country, but we can't impose these things upon the people. They must come voluntarily and seek to improve their health. Col. Leonard Rowntree, Chief, Medical Division,

National Selective Service Headquarters, stated that Selective Service is holding a mirror before the public and giving the facts and indicating the need; on this basis should be built a new public health for the nation.

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Saving Sight in the Young Adult Through Social Service*

Mrs. Ophelia Settle Egypt

MRS. EGYPT indicates how the various social services contribute to the solution of the general problem of conservation of sight.

EYE defects rank second as a primary cause of rejection of draftees under the Selective Service Act. Dr. Town aptly asks: "What should have been done before this huge screening test of the nation's health went into effect? What should be done now that we have the information in regard to the defects in the physical condition of our young men?"

In spite of the excellent work of societies for prevention of blindness and the increased activities of the federal government and of some state and city health units, certain gaps in our program for conservation of maximum eye health still exist. This paper is an attempt to explore the possible answers to Dr. Town's questions and to look at the gaps in the programs from the viewpoint of the medical social worker.

What lacks in community agencies are responsible for the fact that approximately 28 per cent of the draftees so far examined were rejected for service? (Later analyses of larger numbers show even higher proportions of rejections. This is also true of rejections for eye defects.) What can the medical social worker do about these gaps in community standards and practices? What of the 11 per cent rejected because of visual handicaps and of the eye health of their children, who will be the young adults twenty years hence?

The Story of John Selectee

The following story of a young man who will soon become one of the group of selectees marked "rejected because of visual defect"

* Presented at the National Conference of Social Work, June 5, 1941.

gives some idea of the picture of the individuals and the communities behind the figures.

John, who will be 21 years old in August, 1941, was referred by the medical social worker in an eye, ear, and throat hospital to a private family agency, which had a special division for service to the blind. The diagnoses were detached retina in the right eye and chorioretinitis in the other. John had been under treatment on the ward for two months. The doctors think that marked loss of vision in one eye probably occurred six or seven years ago, but John apparently did not realize this. The results of treatment had not been as good as expected and the doctor said that the prognosis was poor, that any slight shock or physical movement might complete detachment. John was to be prepared for total blindness. He was referred to the family agency because he had expressed concern about having to return either to a home in which he felt unwanted by his stepfather, or to a married sister who was financially unable to keep him. When the family social worker visited the ward two days later, as agreed, she found that John had been discharged (on the same day that referral was made) without the knowledge of the medical social worker and the record did not indicate the address to which he had been sent. The doctor explained that since John was so restless and prognosis was so poor, a day or two less on the ward could make little if any difference to his eyes.

John was a typical white American boy, loving sports and general outdoor activities. He liked to read adventure stories. He had had difficulty holding jobs but his stepfather said this was because he was lazy, and even his mother thought it "funny that all his jobs petered out so soon." He had enlisted in the National Guard in October, 1939, and a report from this source gave vision as "20/20 in each eye. Eye conditions normal." In January, 1941, he came home beaming because he had secured a job in the delivery department of a large store. At this time he asked his mother to give him money for glasses. When John reported for work, he made so many mistakes in handling the delivery slips that his foreman referred him to the nearest optometrist, who recognized the seriousness of the eye difficulty and sent the boy to the eye clinic as an emergency case.

Through interviews with John and his mother, the social worker was able to obtain the following significant history: John began school in a southern state at the age of seven. He progressed normally through the fourth grade, but repeated fifth grade five times! He finally left school at the age of sixteen. As social workers, our first thought would be, what happened to John after

he entered the fifth grade? The mother finally remembered that John's father died about this time and that John and his father had been great pals and often went on fishing and hunting trips together. Pressed further, she recalled that on one of these trips shortly before the father's death, the powder from the shell in John's gun "fired back in his face." She thought that some of the powder got into his eyes and she recalled that he did complain of his eyes hurting for a few days afterward, but no doctor was consulted. She recalled John's recent request for glasses and regretted that she had failed to get them for him. She could have secured the money from the stepfather, who was financially able to provide adequately for her and John, and who even helped John's married sister occasionally.

In discussing his failure to progress further in school, John admitted that he had some difficulty. "Sometimes I would read a lot and get a headache, or the words would be blurred on the page and then I'd throw the book down and go out and play ball. Even when I read the stuff, I couldn't seem to remember it. . . . At the time, it never occurred to me that there was anything the matter with my eyes. . . ."

Here then is an active, popular boy, accustomed to economic security, who because of a single physical defect is unable to participate in the national defense program. John is now destined to complete blindness in early manhood, blindness that in all probability could have been prevented.

Gaps in Community Resources

The factors that have led to the serious eye difficulty in this case are probably typical of what has happened in the cases of many of our rejected draftees.

The first factor is that John was not aware of his eye trouble until, after various failures to hold jobs, he realized that he could not even see to do a particular job that called for ordinarily good eyesight. His mother, his friends, his former employers and teachers had all failed to think of eye difficulty as a causative factor in the problems presented by this boy. In other words, lack of knowledge of eye symptoms on the part of the general community is one of the gaps that must be bridged if unnecessary blindness is to be prevented.

A second gap shown in this case is lack of periodic eye examinations of preschool children, and of all school children. This implies

also the need for adequate provisions for special educational facilities and vocational training for the partially seeing.

A third danger shown is that of the casual examination, whether by expert or non-expert, and this brings up the importance of knowing where to go or where to refer patients with eye difficulties.

A fourth evident lack in this case is the failure of industry to provide facilities for examination and protection of the eyes of its employees. This includes accident prevention, since so many eye injuries result daily from this source.

A fifth gap occurs in the failure of the communities to provide adequate facilities for medical care and social skills to insure the application of modern scientific knowledge to all kinds of patients.

Turning to a discussion of the specific gaps mentioned above, what can the social worker do to make the nation conscious of symptoms that indicate the need for an eye examination? In the first place she must remember that prevention of blindness in the young adult means also prevention of blindness in the young child. She can begin by learning and then spreading information about eye symptoms through all groups. Non-medical social workers and public health nurses could do a great deal in this area if they became aware of the importance of listening intelligently to client's remarks about their own and their children's physical condition. When they register complaints of headaches after reading; of a child having difficulty in school; of one child who wants only to play and never to study; and of another who reads with his book close to his face and who has to be forced to go outside and play with the other children—all these are indications for further questioning and for referral to a competent ophthalmologist for examination. Just by using their eyes, the social worker and nurse can often observe in their client-group symptoms suggesting need for eye examination when neither parent nor child is conscious of such symptoms.

Teachers in all schools, public and private, from kindergarten through college, form another large group needing education along this line. They get the children who are forced to use their eyes for close work, and often this is done in poorly lighted rooms with too little light or too much glare. These teachers have an excellent opportunity to notice the general behavior of millions

of children and young adults and to refer them for examination. Most of them would be interested if they were only made conscious of the importance of the rôle they can play in conservation of sight. Suppose John's teacher had stopped to try to find out why he failed the fifth grade the first time. Suppose she had asked him if he had headaches or any other difficulty when reading. Had she been conscious of the meaning of symptoms and referred him immediately for adequate medical care, John might be acceptable for the draft when he is called up in August. Not only that, but he might have been able to hold a job and to have become an independent, happy and useful citizen of a peaceful America! If only John's teacher had used the National Society's list of observable behaviors suggesting visual disturbances! Parent-Teacher Associations' programs are useful means of reaching both kinds of responsible people close to young children. Certainly parents constitute the largest group needing information regarding the meaning of symptoms.

Numerous civic groups also can be reached through the press and through platform and radio talks. Societies for prevention of blindness are making progress, but medical social workers outside these societies also have the responsibility of making their communities "eye-symptom conscious" if they are to save sight in the young adult.

In John's case, knowledge of the meaning of symptoms alone would not have prevented eventual blindness. It would also have been necessary to know where to obtain a thorough eye examination instead of a casual one, the second danger shown.

Even if John's parents and teachers knew nothing of the meaning of symptoms, yearly eye examinations of the preschool and school children by a skilled ophthalmologist would have picked up whatever eye difficulties John had at that time. John told the social worker—"Down there they didn't have doctors in the schools like they do up here to check on the kids." Since John suddenly failed the fifth grade five times, he probably needed the special educational methods used in sight-saving classes to enable partially seeing children to profit by the free education considered an essential part of the democratic way of life. In the ideal community, vocational guidance and training would have been available as he grew

up. Such educational and vocational services are equally necessary to all social and economic groups, regardless of religion or race.

An example both of complacency and of the shortsighted business method involved in neglecting to cover all groups in a social program can be cited in a southern city where there are six sight-saving classes for white children in the grammar schools and one in the high school. The Negro elementary school population is about 20,000, but no provision for sight-saving classes for them has been made. The same is true of practically all rural children and the children in most of the smaller cities in this state. Granted that it is a step forward to provide for one group of children, it is even better economy to provide for all children in every community.

The southern states are not the only backward areas in the country. Even in the nation's capital, sight-saving classes and teachers for the Negro children are woefully inadequate, and this statement is generally true of provisions for all children, Negro and white, in the small town and rural area of the entire country. The country must be awakened to the necessity of closing such gaps if the eye health of the young adult is to be protected. Think also of the taxes the community of which John is now a resident might have saved; for now it will have to care for this blind youth for a possible forty or fifty years. Suppose John lives forty years longer, that is, to the age of 61, and during that period receives the maximum blind grant of $40.00 per month (which is certainly a small enough amount for a single person for all expenses), the community will have spent on this one individual almost $20,000! This does not count the cost in suffering and frustration to John or the cost of administering the grant, and the cost of medical and social services; nor does it count the cost to industry and to the defense program in being deprived of this man's working power. Suppose John's state had spent this same amount of money for the services of an ophthalmologist and a medical social worker trained in eye work—not one child but thousands of school children would have benefited.

The third danger mentioned earlier in this discussion is the varying quality of medical examinations and the problems growing out of the false security engendered by casual examinations. John was examined when he volunteered for the National Guard in October,

1939, and his eyes were reported normal. Not knowing how or by whom this examination was done, or whether inflammation of the choroid and retina in the first eye resulted from the accident in John's childhood, it is only possible to question whether the examination in this particular case was a casual one or was not done by an expert person. However, the history given suggests that a careful examination by a competent ophthalmologist at the time he volunteered would have revealed some eye pathology two years ago. Whether or not the difficulty in this case began after the eye examination in 1939, the fact remains that the public needs education regarding persons from whom competent eye examinations can be secured. It is also true that a casual eye examination by a physician is just as dangerous as a casual examination by an untrained person. In 1941, John was sent to an optometrist who knew enough to recognize the need for immediate attention by an ophthalmologist. Unfortunately, he reached even the optometrist too late. John is no exception: many otherwise well-informed people often do not know where to go when their eyes trouble them.

It will be remembered that John as a small boy had an eye accident while hunting with his father. He complained of his eyes for a few days and received no medical attention. Thousands of accidents happen daily in the street and in the home as well as on the job. Safety programs and campaigns are helping to reduce hazards but not nearly enough is being done. The average child and adult must get the psychology of safety into their beings; they must learn that it is smart to take time to be careful and to go to the doctor for a thorough examination of the eye following even the slightest eye accident.

The fourth danger revealed in this case is the failure of industry to examine John's eyes before employing him. This caused waste to the employer, as well as further delay to John in obtaining care. Dr. Hedwig Kuhn said: "Perhaps the most dangerous person in today's complex economic setup is the unconscious saboteur. His number is legion. His lack of visual co-ordination makes of him an unwitting, and usually totally unconscious, so-called 'Fifth Columnist.'" The employer who fails to provide pre-employment eye testing and the services that will prevent the making of this kind of fifth columnist is a great danger to the nation's safety.

The Medical Social Worker and a Rounded Program

As pointed out by Miss Baker: "The medical social worker is concerned not only with the need of the individual patient under treatment, but also with the resources of the medical institution and the community." We have talked about many of the resources lacking in communities and the medical social worker's responsibility for making the community aware of these gaps. The final discussion centers around the gaps in the medical and medical social services in programs for sight conservation in the average community and the medical social worker's rôle in reducing them. In any such discussion, emphasis must be placed on the fact that a sound program for the promotion of general good health is basic in any program for eye health. The best facilities in the world will be of little use if the population is not educated to the point where it recognizes the need for them for its own health and protection.

The medical social worker, then, must not only agitate for adequate medical resources: she must also help to educate the community in the use of these resources. Stimulated by the Federal Government, many states and cities have remarkably improved in both the provision for these resources and the education of the community in the use of them, but there is no community which can boast that it has nothing left to do in this area. A few examples of the gaps in the area of communicable disease control will be given. The lack in medical care for the newborn child is appalling even in larger cities with sufficient legal provision for such care. For example, one local society for prevention of blindness recently made a study of the status of ophthalmia neonatorum. In spite of legislation requiring the use of silver nitrate, one hospital with over 4,000 births during the period studied used argyrol as the prophylactic. This hospital had the unusually high rate of one case of ophthalmia neonatorum per 25.70 births, or 39 cases per 1,000 births. Following the discovery of the above facts, the health officer called the attention of physicians and hospitals to the existing legislation, and at present all are complying with the law.

This study again raises the question of the medical social worker's responsibility for keeping up with the newer methods of treatment of eye diseases and seeing that the patients get the benefit of this knowledge. One step here is seeing that general social workers

know about these new methods of treatment. It was found in 1940 that in Oklahoma, where trachoma is common among white people, general agency social workers were not aware that sulfanilamide was controlling trachoma in Indian children in their own state. The Indian Service was complaining that their work was handicapped because the Indian children were constantly being reinfected by untreated white children.

Although programs for the control of venereal diseases have been given great prominence of recent years and are decidedly a part of any plan for conservation of vision, there is still much to be done. The social worker can check her own community's venereal disease control program with that in the most progressive communities, and use all the facts and figures she can find to awaken the community to the need for further progress and saving of human and financial resources by providing for a health program that will make it as difficult for a doctor to find a case of venereal disease for demonstration purposes as it now is to find a case of typhoid in our more advanced cities.

There is some disagreement among doctors as to the degree that eye health can be affected by malnutrition, but most of them would admit that it plays an important rôle. Many would also agree that infected teeth are often partially due to poor nutrition and that such teeth form a possible source of focal infection. If this is true, then the fact that failure to meet the dental requirements ranks first as a cause of rejection of draftees is also significant from the point of eye health. Recently the National Dental Hygiene Association was organized by laymen for the purpose of education regarding the need of dental care.

Better nutrition for the entire population might have saved teeth as well as eyes, and some authorities even believe that there is some causal connection between malnutrition and myopia, the eye defect which Dr. Town found one of the most common eye causes for rejection of draftees. Faulty nutrition, like eye disease and defect, is found not only in the lower economic levels, but in all economic and educational classes of society. It is therefore necessary to begin the program for preservation of the sight of young adults with education of the pregnant mother as to the dietary essentials and regular dental care for herself and child. It is tragic

that many private doctors not only fail to discuss this matter with patients in the upper intellectual and economic circles, but do not even make blood tests of pregnant women.

One of the newer types of treatment resources found in only a few communities is the orthoptic clinic, where a skillful technician under the supervision of the ophthalmologist teaches the patients how to improve vision. So many questionable practitioners have advocated exercises for strengthening eyes that the genuinely careful work of the few people with enough patience to work carefully and scientifically has been criticized. As time and the accumulation of skill and knowledge in this area show how many children with imperfect vision can be improved, this form of treatment, which is not a panacea, will be available to more and more of the patients who really need it.

Another part of an eye health program which has been questioned because of the exaggerated claims of some enthusiasts is lighting. The adequately lighted home, school, office, or industrial plant is unfortunately unusual, and yet we know that improper lighting aggravates eyestrain. Experts can now tell us how to equip a building for proper lighting and there is no excuse for the amazing lag in this area.

Emphasis has been placed on the responsibility of the medical social worker to help activate and improve the community resources for prevention of blindness, working with other professions to this end. It is not to be inferred, however, that she is to neglect her most important job of providing case work services to individual patients with the visual handicaps.

The medical social worker seeks to see the person with the disease and learn his individual feelings and ideas about his particular handicap. She knows that each patient reacts individually to his disease and to each step in its treatment. She knows also that her job is an integral part of medicine itself, and physicians are becoming more generally aware of the need for medical social workers in any medical institution attempting to help the sick or handicapped person. However, hospital administrators are slow to recognize the necessity of having a worker specially trained in the understanding of the diseases and defects of the eye. Some ophthalmologists are recognizing the contribution the social worker,

as a necessary member of the medical team, can make to the patient; others have been slow to utilize this kind of skilled personnel.

If a better showing is to be made twenty years hence, the program of prevention must cover the entire population. The medical social worker's responsibility is twofold: first, that of providing adequate social case work services for the visually handicapped; and second, awakening the general public to the gaps in the programs for conservation of vision, thus stimulating within the communities the desire to eliminate these gaps.

It is a strange paradox that general interest in conservation of health should receive its impetus from wars, which take so great a toll of human life. When we begin to select men to die for our country, we are startled at their lack of physical fitness for this great task. We must become as genuinely concerned in conserving the health of all the people so that they may be fit to live abundantly and enjoy the maximum benefit from living in a truly democratic society.

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Consultation services of the staff of the District of Columbia Society for Prevention of Blindness.

Prenatal Factors as Causes of Blindness

Leona Baumgartner, M.D.

DR. BAUMGARTNER presents herewith a discussion of the prevalence of blindness associated with pregnancy and birth; the factors of hemorrhage at birth and prenatal nutrition; the problems of ophthalmia neonatorum and prenatal syphilis; and how all these affect the eyes of the newborn.

HE WHO accepts the responsibility of discussing this topic is soon unhappy, for he finds himself in the precarious position of being judged either an ignorant fool or a blind egotist to imagine that he can do so effectively, for there are so few facts to guide him, and it is axiomatic in this scientific age that prevention is accomplished only when the problem is thoroughly analyzed, when causes are recognized, and when there is sufficient knowledge to point the way to specific means of prevention. The prenatal factors which cause blindness are not well recognized. A few specific methods of attacking the problem are known, but even if these were to be effectively used (which they are not) we would hardly scratch the surface. Even the boundaries of the problem are ill defined. Who are the people about whom we are talking? Where are they? Why are they blind? Could their blindness have been prevented? Isolated stories of persons without sight at birth have stirred the hearts of humanity since time immemorial, but such tales help little if we are to attack the problem of preventing these disasters in the future.

Prevalence of Blindness Associated with Pregnancy and Birth

From two sources one seems to get a picture of the extent of this problem of prenatal factors as causes of blindness in the United States of today. The first comes from the reports of the Committee on Statistics of the Blind of the National Society for Prevention of

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From two sources one seems to get a picture of the extent of this problem of prenatal factors as causes of blindness in the United States of today. The first comes from the reports of the Committee on Statistics of the Blind of the National Society for Prevention of

Blindness and the American Foundation for the Blind. The most recent is a study of 3,868 children enrolled in schools for the blind in the United States in 1938–9.[1] It is estimated that two-thirds of the children in all such schools are included. About 90 per cent are under twenty years of age. Blindness in infants is difficult to recognize, so that it is reasonable to assume that most of those discovered blind by the age of one may well be blind because of some condition present near the time of birth. The statistics showed that two-thirds of the children now in schools for the blind were blind at or near birth. One concludes tentatively, therefore, that the prevention of blindness must necessarily concern itself actively with the problems of prevention of those causes of blindness associated with pregnancy and delivery.*

That little progress has been made in this direction may be inferred if one compares these 1939 figures in the United States with those from one of the few other studies available—those for children in similar schools in Denmark from 1898 to 1921.[2] Then only one-third of the children were reported blind before one year of age. Does this mean that the number of those blind because of other causes has been reduced, leaving a larger percentage today attributable to prenatal factors? When we remember the excellent services rendered to pregnant mothers in Denmark—services which have long been the envy of the rest of the world—we ask if this program can have made the difference? Perhaps, but the data upon which both of these studies are made are limited and it is obvious that comparisons of this kind are often dangerous. Nevertheless, one is left with the impression that a large percentage of children in schools for the blind are there because of something that happened to their sight before or near the time of birth.

Is this an important factor in the total picture of blindness in the United States today? Only last week a report appeared which gives us at least a hint. This is the study of prevalence of blindness as recorded in National Health Surveys conducted in 1935–6.[3] This, you will remember, was a house-to-house canvass of families in several parts of our country. The data collected are subject to

* Little attempt will be made in this paper to separate those causes of blindness associated with pregnancy and acting before labor and those acting at or near the time of labor, inasmuch as effective programs for prevention will necessarily deal with birth problems.

many criticisms. However, the extent of the survey makes its findings useful, and in its reports is often found information not available elsewhere. Obviously, in such a house-to-house canvass, most of the institutionalized cases of blindness were excluded. A person was called blind if the lay informant considered the vision impaired to a degree which he considered "blindness." Almost 2,500,000 persons were studied. In contrast to the school studies noted above, about 88 per cent were over 25 years of age; 409 out of each 100,000 were blind in one or both eyes, and 5 per cent of these were blind before 15 years of age.* There was a marked increase in prevalence of blindness with increasing age as a result largely of subsequent disease and accident. Thus, in the total picture, blindness associated with birth may seem not as important a factor as previously indicated. However, when one considers the fact that the high prevalence of blindness due to other factors occurs later in life when the serious problems of education, economic support, and institutional care are not so urgent, one realizes the importance of those cases in which blindness is present from infancy on.

Additional evidence of the importance of prenatal factors in causing blindness is secured if one scans the studies which have just been discussed from the point of view of the alleged cause of the blindness. In the 1938–9 school study[1] 49 per cent were attributed to prenatal causes, with an additional 5 per cent due to prenatal syphilis and an additional 9 per cent due to ophthalmia neonatorum, making a total of 63 per cent, again leading to the conclusion that two-thirds of the problem of blindness in these children is due to factors associated with pregnancy and birth.

In individual schools this problem has in some instances been studied more intensively. Thus, since 1934, members of the ophthalmological faculty at the Indiana University School of Medicine have examined children at the state school for the blind.[4] The group is small, 187, but the medical reports probably are more accurate than many others in the literature. Here, in 44 per cent, the etiological cause is stated as congenital, with an additional 12 per cent due to prenatal syphilis and 15 per cent (14.9) to ophthalmia

* Since the blind of school age are usually in state residential schools (that is, institutionalized), the proportion of the blind under 15 years of age may be underestimated in this survey.

neonatorum, a total of 71.2 per cent of all blindness in this modern institution definitely associated with pregnancy. The diagnoses most commonly found were optic atrophy (34.2 per cent), cataract (18.7 per cent), and ulcerative keratitis (16 per cent).

In the National Health Survey[3] certain broad cause groups were laid down and 5.5 per cent of blindness in one or both eyes was put in a category labeled "congenital and early infancy."

Let us look further into this question of etiology. Five per cent of children in schools for the blind were there because of prenatal syphilis; in one institution the figure was 12 per cent.[4] This is an entirely preventable condition. Today laws in 26 states require a test for syphilis to be taken during pregnancy; but if, as is well recognized, the majority of women do not present themselves for prenatal care until after the seventh month of pregnancy, we may still have congenital lues. However, we shall hardly expect these infections to be as numerous or as severe as in the days before such laws were initiated. In an intelligent program for prevention of blindness every state will have such laws as well as programs to insure adequate treatment of those infected, and an active campaign to teach the public the need of protecting itself. This is one cause of blindness associated with pregnancy which *can* be eradicated. Progress we have made, but it is hardly enough to be on the right road if we are not moving along it.

The second cause which one wonders that it is still necessary to talk about is ophthalmia neonatorum. In 1884, Carl Credé, that illustrious professor of obstetrics and gynecology in Leipzig, announced that gonorrheal conjunctivitis of the newborn could be prevented by the simple instillation of silver nitrate into the eyes. Any layman could do it and silver nitrate has always been cheap. Yet half a century later the schools for the blind in this country still care for children whose eyes were and are being neglected. Today, with chemotherapy, with sulfonamide drugs effective in treatment of these cases, the prolonged periods of care have been shortened and nursing problems simplified. Let us hope that this cause of blindness soon disappears from lists of causes as completely as smallpox, formerly an important item on such lists.

But what of the other 47 per cent which were gathered under the head of prenatal origin?[1] In 2 per cent the hereditary origin was

established and in an additional 11 per cent it was presumed. Dr. Schweitzer will discuss the subject with you, so I have deleted from this paper any extended discussion of these hereditary factors. I will mention a few points of particular interest to me as I studied the subject.

It is a long story, for the discovery of color blindness as an hereditary trait, as early as 1777, stimulated the interest of physicians as well as biologists in hereditary abnormalities of the eye. Geneticists have long collected family pedigrees of those afflicted with these conditions, and one has only to remember the enormous numbers of the famous fruit fly, *Drosophila*, which have been sacrified in experiments to prove the mechanism of transmitting the color of the eye, to realize what an enormous literature exists on this subject. I was impressed, however, with how often abnormalities in the eye had been studied without reference to the rest of the body. Is it possible that a closer collaboration of ophthalmologist, physician, and geneticist would have led to a more rapid development of knowledge? It is, for example, encouraging to see that in the past few years the careful investigation of the eyes of patients with other anomalies[5] and the increased search for evidence of generalized disease in patients with recognized hereditary disease of the eye are leading to a wider understanding of the various etiologic factors at work. But the pages are still covered with theories, and until one knows what defect is in the germ cell, what deleterious chemical or mechanical agent acts on normal germ plasm, can he do more than urge that those definitely afflicted shall be encouraged not to have children. Probably few of those who give guidance in these matters are well informed as to the dangers and non-dangers of transmitting hereditary eye defects. Germany, in July, 1933, by its act of protection against hereditary diseases, provided for the sterilization of persons with hereditary blindness on both voluntary and compulsory bases. It is to be hoped that some scientifically accurate figures may be kept of this experience.

Let us leave the hereditary and presumably hereditary diseases leading to blindness and look at the other so-called prenatal causes of blindness. And we may well be dismayed. In the study of 3,868 children in schools for the blind in 1938–39, 1,386, or 36 per cent, were merely labeled "prenatal origin, cause not specified."[1] Here

were 390 cases of congenital cataract, 203 of coloboma, 201 of congenital glaucoma, 146 of optic nerve atrophy. But what leads to these conditions? Texts are filled with long anatomical and pathologic descriptions. These though important first steps can hardly lead to any practical program of prevention. Again theories of causation abound, but the almost complete ignorance of the primal cause and the mechanism of production of the defect is astounding. Until one knows what intra-uterine inflammation, imbalance of what endocrines, what defective factor in nutrition is at work, he is in no position to do much more than study the problem further.

Are there any flickers of light which may lead us to the road of prevention? A few, so let us look at them. Already we have seen a way out through the prevention of prenatal syphilis, gonococcal ophthalmia, and the possible curtailment of reproduction of those carrying chromosomes bearing genes which inevitably lead to blindness. Are there others?

Hemorrhage

Hemorrhage or bleeding is often suggested as a basic cause for several congenital defects. Hemorrhage in the orbit or in any part of the eye may well lead to permanent damage. Hemorrhage in brain centers can also affect vision by injuring nerve connections, control of eye muscles, et cetera. Direct injury to facial nerves or brachial plexus has long been known to leave its mark on the eye as well.

Hemorrhage may occur during pregnancy, at the time of delivery, or perhaps after birth, for let us not forget that the human eye is by no means fully developed at birth. Knighton[7] has reviewed this subject in one of the publications of your Society only recently. The hemorrhage associated with the injury at the time of birth demands special consideration. When one thinks of the possibilities of injury associated with forcible removal of a head in instrumental deliveries or of a long period of pressure on the head during prolonged deliveries, one knows that better care at the time of delivery will lead to a reduction of the cases of blindness attributed to prenatal causes. The obstetrician plays the essential rôle in that he can largely control when and how the head of the infant shall be delivered.

The tendency of the newborn to bleed has long been recognized. Is it possible that this tendency is responsible for a certain percentage of congenital eye defects? Retinal hemorrhages, for example, are not uncommon. The significance of such hemorrhages has often been questioned by pediatricians who see many of these infants grow to maturity without impairment of vision, though unquestionably others are not so fortunate. More widespread hemorrhage in the newborn is also not uncommon. Is it possible that vitamin K, which is used effectively to combat certain hemorrhagic tendencies in adults and infants, can be of use in reducing defects in the eye attributable to hemorrhage?

Evidence for this view seems to be convincing. The workers at the Johns Hopkins Hospital[8] have for several years studied the effect of vitamin K on mothers and newly born infants. Carefully controlled studies have been made. Retinal hemorrhages have been reduced from 32 per cent in cases receiving no treatment, to approximately 15 per cent when the vitamin K has been given during labor, and almost no hemorrhages in cases receiving therapy four days prior to labor. The vitamin may be given directly to the infant if it has not been given to the mother, but predelivery administration is more desirable. Several hospitals are using vitamin K routinely in all deliveries, for it not only reduces retinal hemorrhages but stops bleeding elsewhere, particularly in the brain, which may, as we have previously stated, also serve to protect the child from loss of vision. The structure of antihemorrhagic vitamin has only recently been elucidated. A number of naphthoquinone compounds possess vitamin K activity. It is not expensive and may be administered in a convenient tablet to be taken by mouth, or it may be injected parenterally.

Nutrition

In these days of feverish activity and discussion of the problems of nutrition, one may well ask if the nutrition of the mother has any effect upon loss of vision in her baby. The effect upon the eyes of deprivations of vitamin A and some of the factors in the B complex has been recognized for so long, and so widely discussed, that it seems unnecessary to review the story here. Let us remember, however, that these observations do not prove that adequate nu-

trition in mothers will prevent congenital blindness. There is no evidence to support such a thesis. In the present day enthusiasm for nutrition, let us remember that campaigns and slogans built upon insufficient scientific fact may do more harm than good. We have only to remember that fallacious cry of "a clean tooth never decays" to remember how easy it is to teach the public something we have to ask them to cast aside at a later date. Let us be cautious today.

However, several observations are of interest and do suggest the importance of an adequate diet of the pregnant mother to the child and his sight. Thus, in analyzing experience in Danish institutes for the blind over 26 years, from 1895 to 1921, Norrie[2] points out that 44 out of 88 cases of xerophthalmia found appeared in the six years of the World War period when there was a lack of milk and vitamin A. In Toronto, within the past year, certain results have indicated that adequate nutrition of the mother leads to fewer stillbirths, miscarriages, premature births, prenatal anemia, toxemia and illness of the infant during the first six weeks of life.[9] Three groups of mothers were watched—all from low income groups. First, a group on good diets when first seen, who were advised in making their diets as good as possible; second, a group on poor diets to whom were given daily certain supplements; and a third group left on a poor diet, as controls. These studies are subject to certain criticisms and will need further confirmation before one is justified in building a widespread program on their results, but it is obvious that they are important and may have further significance in programs for the prevention of blindness. The existence of lamellar cataracts in patients who also show other evidences of nutritional deficiency (enamel of the teeth) is often quoted as evidence that such defects are due to nutritional deficiencies of the developing lens.

The Question of the Rh Factor

In searching for adequate explanations of causation of the congenital and hereditary conditions about which we have been talking, one seizes upon any new discoveries which may explain irregularities in the normal development of the fetus, on the presumption that these may be of aid in explaining eye defects as well. Re-

cently a very exciting chapter has been written in the story of one such abnormality, namely, that of *erythroblastosis fetalis*, a severe hemolytic anemia of the newborn. It is estimated that it occurs roughly once in every 1,000 births. Some types show a familial tendency.

And now to the fascinating mystery story.[10, 11, 12, 13] In 1940, a strange antigen (the Rh factor) in the red blood cells was first described by scientists who have long been interested in various characteristics of human and animal bloods. Of the population, 85 per cent was found to have such a substance, and in the other 15 per cent it was lacking.[10] It was only natural that the scientists, always curious, wanted to study these phenomena further, even though there seemed no immediate reason to believe that they were associated with disease. By such curiosity is science often advanced—"smelling down all rat holes," it was once called. And so the Rh factor was injected into rabbits and an antibody was formed for it—an antibody which would cause red cells to clump together in a test tube or dissolve in the body. The factor was apparently inherited as a *dominant*.[11] And finally to a new theory—could it be that a mother whose blood cells contain none of this Rh factor, if married to a man whose blood cells do contain the antigen, will have a child whose blood cells will be like those of his father? If so, would she not develop antibodies toward the antigen contained in her own child's red cells? And, finally, if these antibodies penetrate the placenta, will they unite with the red cells of the developing fetus and cause destruction of the red cells of that fetus? A weird theory—but it seems to be working. In 200 cases of severe hemolytic anemia of the newborn, all infants and fathers have had the Rh factor and in 93 per cent the mother has lacked it.[14] The story is not completed and there are other chapters already written which are of great interest.

You may ask why we should discuss such a tale at all—not merely because here emerges a possible explanation of some of the eye defects which have long disturbed us, but because this is an example of how many apparently unrelated fields of research may contribute some day to our fundamental problem of learning the mechanism of production of some now unknown phenomenon.

Other Problems in Prevention

Let us suppose that certain infants are born with certain eye defects due to hemorrhage, nerve injury through pressure, or any other cause. Is there anything that can be done to prevent, in the face of such injury, the development of impaired vision? Most certainly the answer is, yes. Injury to the lids may expose the cornea to a keratitis which can be avoided with proper eye hygiene. Direct injuries to the cornea during or near birth through, for example, trauma or the use of too concentrated a solution of silver nitrate can lead to corneal opacities, but the number of infants who enjoy the benefits of a visit from the ophthalmologist at this time is too small. Conjunctivitis may be due to infection not only by the gonococcus, but by the pneumococcus, streptococcus, staphylococcus, or other pyogenic organism. Early chemotherapy may save the spread of these infections. Obstruction of the lacrimal ducts may be seen in newborn infants, but is usually not recognized until the age of 4 to 5 months. Premature and unskilled probing may well lead to serious damage.

These, and many other examples, point to the great need for further collaboration between the ophthalmologist and the physician who cares for the infant and young child. The latter often knows little of how to make an adequate examination of the eye of a newborn. The small retinal hemorrhage may be the sign of a more serious hemorrhage elsewhere, and an indication for immediate measures to control further bleeding, but how many infants being examined have a retinal examination? The nurse is most closely associated with the newborn, but how much does she know of the importance of early signs of abnormalities in the eye?

That earlier diagnosis of certain conditions can lead to the prevention of later impairment of vision seems axiomatic and is also borne out by those who have studied children in institutions for the blind. Thus Masters,[4] who examined carefully 187 children at the Indiana State School for the Blind, stated that the diagnoses which committed these children to the institution are nothing short of scandalous. The causes of blindness given on entrance applications included "neglect," "following flu," "Eye-ritis," and a score of equally descriptive terms, all in cases which subsequent examination proved were due to causes which are well recognized and readily

diagnosable. If the medical care given these children after entry is no better, one can expect that many cases will probably become totally blind, when at least some vision might have been preserved.

Moreover, some of these children had sufficient vision that they should never have been taught with the blind, but should have been out learning to use what sight they have. Probably sight-saving classes in a regular school were all they needed. And let us remember, visual acuity is not merely dependent upon the condition of the eye. We probably, as has been aptly said, "learn to see." If there is not stimulation, no direct effort to teach a child to see, will he learn it? Moreover, in terms of psychological rehabilitation it is obvious to the child specialist that the segregation of such children may be adding more to than subtracting from their total handicap. It is obviously questionable, too, if this is an economically sound way in which to solve the problem. But I am digressing from my topic.

Summary

What does all this maze of information and lack of it lead to in formulating a program which the National Society for the Prevention of Blindness might urge in the field of prevention of blindness due to factors associated with pregnancy and delivery? Certainly "Now we see through a glass, darkly"—and to quote again from that famous chapter, for "we know in part, and we prophesy in part," but let us see whether we cannot agree upon a few points:

1. There is no question that there is great need for more fundamental research. There should be research which will ultimately lead us to have exact knowledge of the primal causes of the defects we have described and specific measures for their prevention. Such research cannot be done by any one group of specialists. Research, too, must be directed towards developing methods of diagnosing earlier the defects which later give trouble.

2. There is little question that there is great need of educating the physician, nurse, social worker, marriage counselor, pastor, parent, school teacher and school child appropriately of the danger of inheritance of certain eye defects—but only those which science has shown are definitely dangerous. An honest effort can be made to learn whether an hereditary con-

dition exists and to present the facts of the case frankly to parents and prospective parents. This may be considered primarily the job of the physician, but the nurse can contribute much by careful history taking, calling the physician's attention to the presence of eye conditions in other members of the family, and, with the physician's consent, interpreting to families the probable nature of the defect and what it means both in terms of the likelihood of additional cases if the family produces more children, and in terms of the need for close ophthalmological supervision of all members of the family who may have certain hereditary tendencies. Social workers, teachers, pastors, guidance personnel, all may be useful, too, in spreading appropriate information. I doubt if the routine pre-conceptional consultation which seems an ideal solution to the problems will be effected until we are willing to change radically the curricula of our secondary schools and accept realistically the fact that our children will not be prepared for parenthood unless we make moves to prepare them.

3. The need to have closer co-operation between those chiefly concerned with the eyes and those concerned with other medical care of the child and his parents is obvious. It would sometimes seem as if the one group acts as if a child, for example, were all eyes and the other, that he were a child without eyes. Increased co-operation should lead not only to increased knowledge but to more attention to the earlier discovery of remediable eye conditions, and to more adequate treatment of those who are found with such defects. Let us remember, too, that if we do not demand a better diagnosis and more precise recording and analysis of what we do find, we shall be in no position to know where or what our problems are.

4. The need to urge adequate prenatal care program and good care at the time of delivery is an old story. But we are far from achieving our goals either with the public or with the profession. Women still do not seek out doctors to find out whether they are healthy enough to have babies, nor do they go to doctors as soon as they know they are pregnant. Preconceptional care for those who desire it is not often given by doctors, who also miss many opportunities to render adequate prenatal supervision. Probably one of the chief results of prenatal supervision has been the reduction of severe toxemias of pregnancy—and it is often suggested that this is associated with congenital blindness. More adequate nutrition may also be important, though conclusive evidence is lacking. However, certain procedures are of proven value in preventing congenital

blindness, and in prenatal treatment of the syphilitic, in the administration of vitamin K before delivery, and in the specific prevention of ophthalmia neonatorum. The value of one of the last mentioned has been known for half a century, but there is still ophthalmia neonatorum. Must we wait another fifty years to use the tools we have developed since then to prevent blindness in children? And is it not time that we consider a good prenatal program and good care at the time of delivery a contributing factor to a program for prevention of blindness?

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Heredity in Relation to Blindness and Its Prevention*

Morton D. Schweitzer

SOME of the hereditary diseases which are known to lead to serious impairment of vision are discussed by Dr. Schweitzer, who calls attention to the necessity of informing those who have an hereditary condition of the possibility of transmission.

IN discussing the role of heredity in blindness, I want to start with a consideration of the prevalence of hereditary blindness. Unfortunately, accurate statistics are not available, so that it is possible to present only an approximate estimate, which may be subject to wide error.

In a general way, it is known that hereditary factors are far more important in childhood cases than in those which have later ages of onset. The etiological breakdown of eye conditions among pupils in schools for the blind in 1938 and 1939, as published by Miss Kerby last year, would suggest that about half of the reported cases may be classified as of prenatal origin. As Dr. Baumgartner has already shown us, many cases now included in the prenatal group should not be considered hereditary at all; and, undoubtedly, in earlier studies of familial incidence, cases were reported as hereditary, due to the failure on the part of the investigator to evaluate those factors which were prenatal but nevertheless non-hereditary. One may hazard a guess, then, that perhaps half of the prenatal group, or one-quarter of all childhood cases, are genuinely hereditary. In the adult cases, the basis for an adequate estimate is even less satisfactory. No adequate survey is available; in addition, for two of the most important conditions leading to blindness, that is,

* Presented at the Biennial Conference of the National Society for the Prevention of Blindness, New York City, December 5, 1941.

cataract and glaucoma, the role of heredity has not been established, which makes an estimate even more uncertain. Most conservative workers give an approximation of 10 per cent hereditary cases in adult blindness, but this is frankly speculative. It is one of our most important problems to make our future estimates more accurate than the guesses to which we must at present resort.

Perhaps it would be in order at this point to give a few simple facts about heredity by reference to diseases which are known to lead to serious impairment of vision. Congenital ptosis and familial types of corneal opacities may be mentioned as illustrations of simple *dominant* inheritance. In these cases we will usually find that the condition occurs in about half of the children of an affected individual; further, an affected individual generally has an affected parent. Normal individuals, even if descendants of cases, do not transmit the trait.

Sex-linked inheritance is involved when a given condition occurs principally in the sons of a family, although the daughters of the same family are often involved in its transmission. This type of inheritance occurs in megalocornea and in certain instances of nystagmus. The rules covering transmission in this type of inheritance are as follows: Sons of affected fathers are characteristically normal, and normal males do not transmit the condition. The daughters of a case are normal but are carriers, and may transmit to half of their sons. Normal mothers and sisters of cases are often carriers and may transmit to many of their sons. In fact, a sex-linked condition may be carried through several generations of female carriers before reappearing in a male member of that family. Cases in women may occur when an affected male marries a carrier female.

The third type of inheritance is known as *recessive*, and here infantile glaucoma and congenital day blindness may be taken as examples. These conditions may occur in brothers and sisters and cousins and other more distant relatives, but are usually absent in the parents of cases, and are also absent in the children of cases. Because the human family is so small in comparison with the animal and plant groups, we frequently find sporadic cases of these recessive traits: but where the family is sufficiently large, we can usually find cases in collateral relatives. In these recessive condi-

tions, we are more apt to find a greater than average prevalence of cousin marriages. This is true not because cousin marriages are in themselves harmful but rather because within these family stocks the undesirable hereditary trait is more likely to be present in both mates when they are cousins. In other types of inheritance, cousin marriage is usually of little significance.

This briefly covers the three principal mechanisms of heredity, and by these we may ordinarily be guided in making our estimate of any given family situation. However, exceptions to these rules as outlined are known, and before applying them to a given case, it is important to have available adequate information about the family, so that we may judge whether this simple résumé is adequate for the case under review.

It is also important to point out that having one of the traits just enumerated is not synonymous with eventually becoming blind. For example, not all corneal opacities are hereditary, and not all individuals who are affected with hereditary corneal opacities will necessarily become blind. That is, within a family, the trait may be present in three or four members, but in only one or two of them might it be severe enough to reduce vision below the level of useful functioning.

Very little is as yet known about the role of heredity in most eye diseases. Even in those in which it is suspected of being an important element, we do not usually know enough to be able to make an authoritative statement on the specific mechanism of inheritance. We do know that the subject is far more complex than was at one time believed. It is no longer rare to find that two individuals whose medical diagnosis is very similar (for example, microphthalmos) may nevertheless exhibit quite different patterns of heredity in their respective families. Accordingly, we must expect to put a great deal more hard work behind us before we shall be in a position to answer the pressing questions regarding heredity in diseases of the eye.

I am sure we are all interested in the practical use to which we may hope to put our knowledge of heredity in the field of eye diseases. Not so long ago it was thought that the most important immediate application of heredity in medicine would consist of education for the restriction of families in which serious hereditary

diseases are known to occur. But our experience has shown us that this is not the only, nor perhaps at the moment the most important, factor to be considered. For it is a fact that only a very small percentage of the blind are offspring of blind parents. If we extend the group to include those who have blind relatives (excluding, of course, traumatic and infectious cases), the proportion is larger but still far from constituting the major immediate problem in blindness prevention. On the other hand, we may not withhold information but must stand ready to help those who request it regarding the risk of transmission of a trait known or believed to be hereditary. Not infrequently, individuals who do not wish to pass on their own affliction to their children are led to do so due to the ignorance of physicians on the subject of heredity.

I would like to go on by refuting one type of pessimism that is frequently encountered in professional circles on the subject of heredity in disease. It is often stated that while medicine may be able to treat and cure a pathological derangement of a formerly normal tissue, we have no means of providing parts which may be lacking due to some hereditary abnormality. At one time this fear was perhaps not inconsistent with the status of medical and surgical knowledge, but now we need no longer be bound by these restrictions. I need only point to the technique of corneal grafting, for example, as affirmative evidence that the medical horizon is truly unlimited and that hereditary diseases will eventually be as easily treated and cured as any other.

There is an important field which offers hope of rapid preventive accomplishments through knowledge of heredity. I have in mind the latent cases among the relatives of the hereditary blind, to which I have already referred. Glaucoma is perhaps as good an example as we can find. While there is no known method at present of restoring the vision of far advanced cases, ophthalmologists are often able to arrest incipient cases of glaucoma and to prevent further loss of vision in patients whom they can keep under observation and treatment. Facts which have come to light make it apparent that the use of case-finding methods in the families of the glaucoma blind will yield rich returns in the field of blindness prevention. Here is indeed a job to which the full resources of official and voluntary agencies may be put with great effectiveness.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request.

Chronic Glaucoma*

Definition

Glaucoma is a disease affecting the eyes. It is characterized by an increase in intraocular pressure, with loss of vision. Without proper treatment, blindness results. Vision lost from glaucoma is never regained.

Incidence

Approximately 20,000 patients are blind from glaucoma and are receiving aid from organizations for the blind. An analysis of material from clinics and from private ophthalmological practice shows that there are between 150,000 and 200,000 patients with glaucoma in the United States. There are many more patients with this disease who have never visited the ophthalmologist and are untreated. No age is immune to the disease, but it is most common among persons of 40 to 70 years of age. No geographical difference in the distribution has as yet been noted.

*Prepared for the general practitioner.

Symptoms and Signs

Glaucoma is a bilateral disease. It is unrecognized in many individuals because the symptoms at times are so minimal that they are disregarded by the patients. Intermittent slight discomfort in the eye, heaviness of the eyelids, slight aching in the eye or in the temple, or rainbow-colored halos—any one of these, or all, may be the symptoms. Vision may be blurred for a short period of time and then apparently return to normal. Reading glasses may be fitted and have to be changed repeatedly in a short period of time. Emotional strains of anger, worry, fear, disappointment, or dietary indiscretions may precipitate these symptoms, which entirely disappear after a few hours. One attack is followed by another and yet another. Sooner or later,

following each attack, the physician can observe definite loss of vision.

Central vision is maintained usually until the later stages of the disease. The peripheral vision is lost first, with only a slight defect being present in the visual field. With each succeeding attack more vision is lost until there is only a small island of vision left. To measure progress of the disease, peripheral and central visual fields should be taken repeatedly with very small test objects.

Increased intraocular pressure is characteristic of the disease. The etiological factors producing this condition are not known. The increased intraocular pressure causes most of the symptoms and signs. In the early stages of the disease this increase in tension appears intermittently, but in the later stages it is always present. In the normal individual, pressure varies with activity, emotion, and time of day. It is higher in the morning on awakening, after being in the dark for a considerable period of time—for instance, at the end of a movie—and after ingestion of certain stimulants. It is higher when the pupil is dilated and lower when the pupil is contracted. Any medication which dilates the pupil is likely to raise the intraocular pressure. Any of the above factors are likely to precipitate an attack of the disease.

In exceptional cases the elevation of intraocular pressure to a point considered pathological may not be demonstrated or proved because the normal pressure for these cases is probably below average.

The problem of measuring rise in intraocular pressure is sometimes so difficult that it is necessary to take pressure measurements at two or four hourly intervals during the day and night.

Detecting Glaucoma

Intraocular pressure is measured by the ophthalmologist with a tonometer. Several types of instruments are used, with different standards for each type. However, this method of measurement should be left to the ophthalmologist. Any physician can get a rough idea of the presence or absence of increased intraocular pressure by this simple means: have the patient look down at his feet, place the second, third, and fourth fingers of each hand on the forehead on either side of the eye, place the tips of the index fingers gently on the upper eyelid above the tarsal plate, so as to palpate the sclera, not the cornea, then put enough pressure first on one finger then on the other to compress the eyeball. By judging the amount of pressure which is necessary to indent the eyeball one can roughly determine deviation from the normal. As a control, the physician can readily test his own eye.

In the more advanced stages, the pupil is dilated and responds poorly to light and accommodation. The

depth of the anterior chamber is decreased, and the iris and lens seem to be closer to the cornea than normal.

Late in the disease a very characteristic picture is seen with the ophthalmoscope. The optic nerve presents moderate or deep cupping, more marked on the temporal side. The optic nerve in this area is pale. The blood vessels that run over the optic nerve in this region do so in a peculiar manner. They run from the retina and over the edge of the sclera, disappear in the excavation, and then reappear. This picture is characteristic of glaucoma and is easily identified. A physiological cupping which is normal is sometimes confused with glaucomatous cupping, but the full course of the blood vessels, the absence of depth and extent, and relatively normal color are distinguishing features.

The pupil of an eye suspected of having glaucoma should never be dilated, as serious consequences may result.

In many instances, by the time the patients consult their physicians, they are practically blind in one eye and have a great deal of loss of visual field in the other. It is both desirable and possible for glaucoma to be diagnosed before any visual loss has occurred, because vision destroyed by this disease can never be regained.

Glaucoma is often mistakenly diagnosed as cataract. Once the disease has been correctly diagnosed, patients must remain under observation the rest of their lives.

Treatment

The amount and kind of treatment should be judged by the ophthalmologist.

The first aim is to lower the intraocular tension, and the second aim is to prevent its recurrence.

The first part of the treatment should be under the direction of the ophthalmologist, who should determine whether medical or surgical treatment is indicated. The follow-up treatment is essential. Even though the patient feels that his eyes are doing well, they should be carefully examined from time to time as they may possibly require a change of medicine or surgery. The patient is no judge as to the condition of his eyes or as to the progress of the disease. Many times he will feel that there has been no change but still, on examination, further visual loss is found. There is no place for guessing if glaucoma is to be controlled. Repeated observations are essential to aid in helping control the advances of the disease.

Forestalling another rise in intraocular pressure, the second phase of treatment, is equally important and the family physician or general practitioner can be of great help. Such help consists in persuading the patient to follow these rules:*

* Suggested by the Committee on Glaucoma of the National Society for Prevention of Blindness.

1. Avoid, as much as possible, excitement, anger, worry, fear or disappointment, as these are apt to raise the intraocular tension.
2. Take care that eliminations are regular.
3. Avoid tight-fitting clothes.
4. Keep blood circulation active.
5. Keep teeth clean and healthy. Pay careful attention to acute or chronic colds.
6. Avoid alcoholic drinks. Limit coffee and tea to one cup a day.
7. Sleep in a well-ventilated but not too cool room.
8. Avoid dark rooms as much as possible, and if at movies do not stay too long.
9. Do not use eye washes without consulting the eye physician.
10. Have periodic general physical examinations.

Remember!

Whenever a patient complains of vague disturbances of vision or symptoms about the eyes, keep the possibility of glaucoma in mind. The use of the fingers in taking intraocular tension will give you a lead. In the more advanced stage of the disease, the use of the ophthalmoscope will also give you a lead. Do not hesitate to call in an ophthalmologist. You may be the one to save that patient's eyesight by suspecting the disease and getting treatment started before loss of vision sets in.

Remember, glaucoma! Every patient over the age of forty years is a candidate for the disease.

—C. GREGORY BARER, M.D.
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The Eye in Aviation*

Eye Examination for Pilots

The examination of an airplane pilot's eyes is the first and most important step in his or her physical examination, and is divided into several different procedures.

First, visual acuity is tested, using eye chart at a distance of twenty feet and examining each eye separately, having other eye closed or covered with fairly large opaque card and not by the hand or some small object. The applicant must not be allowed to squint, but must keep eyes open in normal position. It is surprising how a myopic individual or near-sighted person can improve his distant vision by forceful squinting, thus giving an inaccurate visual finding. If one eye is suspected of being worse than the other, then it should be tested first.

Second step in the eye examination is depth perception. In this test the Howard-Dolman depth perception apparatus is used. It is a rectangular box-like apparatus, approximately forty inches by twelve inches and twelve inches deep, with

* Extracted, with permission, from the article, "The Eye and Ear in Aviation," appearing in the *New Orleans Medical and Surgical Journal*, Vol. 94, No. 1, July, 1941.

an open top and sides, and has two black metal rods; one rod being stationary, the other moved by a cord at a distance of twenty feet, with a plain white field as a background. The accuracy with which the pilot approximates the rods is an excellent check up on his or her ability to judge distance in landing and taking off in an airplane. However, I have in mind one experienced pilot, with over five thousand hours' flying time and sixteen years of flying, who never makes a good showing with the depth perception test. It may be he does not take much stock in such a test or does not try to do his best. Yet, this test has been proved to be an important step in the examination of flyers.

Third, the ocular muscle balance test is given to find if diplopia or hyperphoria is present, and if abduction (prism divergence base in) and adduction (prism convergence base out), esophoria and exophoria are within normal limits. These findings are very important and diplopia to any marked degree disqualifies; in fact diplopia disqualifies unless it develops in the extreme limits of the visual field. Hyperphoria of over one diopter restricts the pilot to a non-commercial flying status.

The few persons I have found with hyperphoria to any marked degree have all given the same general history of a severe blow on the head and showed scars as evidence of the injury. One young commercial pilot fell from an automobile and suffered a serious head injury and concussion; months after his recovery he had such a marked hyperphoria that he was advised to stop flying. Another youth failed to get into the Civilian Pilot Training because of hyperphoria; and the scar on frontal bone area, caused by a fall from a bale of cotton several years prior to examination, was the only known cause of his abnormality.

Fourth, the accommodation or near vision is tested and here the young individual passes with the higher rating. The older pilot, approximately forty-five years of age, in most cases, fails to read the small test letters and has to qualify as a non-commercial pilot, the commercial pilot being the higher rating. The natural question arises as to why penalize the older person for presbyopia when reading glasses will correct this condition. The answer is simple; when the eye reaches this stage in life the reaction time of changing from near to distant vision is slowed up, and in fast airplanes of today and certainly in the combat military planes where the landing speed is high and flying speed is terrific, the presbyopic eye can not read the instruments on the nearby instrument panel and at the same time take care of the distant objects and landmarks that are flashing by. This is where split-second timing is not only essential but vital, and the

older individual's eyes cannot make the grade.

I have in my files the record of a man past fifty who first flew an airplane when he was over fifty years of age, and while he had a noncommercial or private pilot's license, he was considered a good pilot. However, he and a member of his family crashed and were killed when flying through a rain storm. The crash might have occurred even with the best qualified young commercial pilot at the controls; yet one cannot forget that failure rather than plane failure seems more likely.

Fifth, the visual fields are tested by simple finger and fixation method, unless some apparent blind spot is suspected; then the perimeter is used.

Sixth, the central color vision is tested, using Stillings or Ishihara tests, these two being pseudochromatic plates; these two tests are very delicate or difficult to pass if there is a slight color vision defect, and where some of the numbers are missed, the Holmgren test (colored yarns) is used. If all colors are matched correctly a normal color vision is recorded. An airplane pilot must be able to detect colored navigation lights, airdrome lights, colored signal panels and be able to read maps printed in colors, and know shades of green and brown on the ground that indicate the kind of territory over which he or she is flying and which help in locating an emergency landing field, should the occasion arise.

Some recent tests have been made on the ability of color defective persons to detect hidden and camouflaged planes and other equipment from airplane observation posts. And I understand the observers with color vision defects were better able to find the camouflaged planes and other objects than those with perfectly normal color vision. If this is true, then there is very urgent need for color blind or color-vision defective observers for more efficient airplane observation.

Seventh, the eyes must be of normal size, and pupillary reaction to light and accommodation must be normal. The ophthalmoscopic examination must show normal media, disks, blood vessels and retinae.

This brief and rather rapid summary of the eye requirements may seem too strict or too difficult for many applicants to pass; however, remember the qualifications above mentioned are for the commercial pilots of the highest standing, and there are modifications for the commercial grades also. Recent regulations permit the issuance of a commercial rating to pilots whose vision is 20/50 or better in each eye and whose vision is brought up to normal, or 20/20 in each eye, by use of correcting lenses.

Requirements for Other Fliers

The requirements for the noncommercial or private flyer are much less exacting. The vision of the

private pilot may be twenty-two hundredths (20/200) or even less, providing correcting glasses bring the vision to twenty-thirty (20/30) in each eye. Then he or she can be given a private pilot's license rating, with the notation on the certificate that correcting lenses must be worn by holder when operating aircraft; this same notation is placed on the commercial pilot's license where glasses are necessary for normal vision. Over ninety-five per cent of all applicants with poor vision that I have examined have been myopes and glasses have made these people see normally in practically every instance.

If the pilot should lose or break his or her glasses while in flight, then the chance of making a safe landing would be very much less than under normal conditions. The fact is that most planes are made with much better protection for the pilot, and many planes made now are closed models which makes the pilot wearing glasses much less likely to suffer an accident to correcting lenses while in flight. It is considered safer and better to wear metal frame correcting lenses beneath plain protective goggles instead of using specially ground goggle lenses. The fact that an individual has become accustomed to the glasses worn, their size, shape and weight, makes it better and more comfortable to use regular spectacles and goggles over them.

In the muscle balance test the applicant having more than one diopter of hyperphoria cannot be qualified as a commercial pilot, but hyperphoria does not disqualify for non-commercial or private grades. Color blindness is not a disqualifying factor for the private pilot.

The presence of nystagmus or strabismus, or ocular diseases or abnormalities, disqualify for all grades of airplane pilot licenses.

Some rather interesting work on intraocular pressure at high altitudes by Pinson and Armstrong has been done to see just what takes place under such conditions. The tests were made on rabbits' eyes and the needle was introduced into the vitreous humor and connected up with the manometer. The live animal and manometer were placed in low pressure chamber, where various rates of pressure changes up to an altitude of forty thousand feet were made. The results of these tests showed even the most extreme barometric pressure changes caused no significant increase in the intraocular pressure at any time.

—DORF BEAN, M.D.
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Nutrition and Sight*

Night blindness due to faulty diet has been known since very ancient times. The Egyptians have writ-

* Reprinted from the *Danish Red Cross Review*, November, 1940, and communicated by the Secretariat of the League of Red Cross Societies, Geneva, Switzerland.

ten descriptions of this complaint, and they recommended liver as a remedy. In modern times, it has been observed, particularly in Russia, during Lent, among undernourished persons. It has also been found to exist in institutions where the diet is less varied than in individual households.

As research work on the subject of vitamins has progressed, it has become apparent that night blindness is due to the lack of vitamin A in the diet.

The ability of the eye to adapt itself to varying degrees of light is very great. Everyone knows that it is difficult to see well when one goes from bright sunlight into a dark room, but that, after a certain time, the sight improves, and after half an hour in the dark the eye's sensibility to the light is 10,000 times greater. It is this faculty for adapting itself to the light that is impaired by the lack of vitamin A, and, precisely because this faculty is so great, it is possible to record the slightest lessening of it.

Complete night blindness, due to incorrect diet, is rare in Denmark. The milder forms of this affection interest us more particularly.

Before this war, when there was good lighting everywhere, it was rare for oculists' patients to complain of not being able to see well in the dark. Today, in the black-out, things are different. It is easy to understand how important it is for aviators, sailors, drivers, etc., to see well in the darkness. But for us who can stay at home, is the fact that we cannot see well at night of no importance? No, not in the least. It should be realized that night blindness is not an isolated symptom, but the sign of a lack of vitamin A in the whole system. Even if the tendency to night blindness is so slight as to be hardly noticeable, this lack of vitamin A may lead to other symptoms which are not unimportant.

First manifestations are a general tiredness, lack of spirit, nervousness, occasional headaches, frequent colds, lowered resistance to infection, extreme sensibility to cold, falling out of the hair, bad condition of the nails, a dry skin, dental decay, eyestrain, dizziness, irritated and inflamed eyes. These symptoms often occur in the spring, or become worse at that time of year if they have already been present before. All or certain of these symptoms may be accompanied by slight night blindness; and they disappear after a treatment of vitamin A, the night blindness being the last to go.

No doubt more than one mother of a family will think: "In our case, this inability to see very well in the dark is not very important; we have good wholesome food." But I should reply: "Can you really be so sure of that? Are you never tired, do your children never have colds, are their teeth quite sound? Does nobody in the household have

headaches? And the old people, are they ailing?"

The answer will certainly have to be "yes" to some of these questions. I only want to tell you that often too little attention is paid to these slight ailments; people are so used to them that it seems normal not to be in perfect health, especially in old people. And yet this is not necessarily the case.

In a great many cases all that is needed is a diet richer in vitamin A. But don't imagine that everything will be changed at a stroke. If for years you have had a faulty diet, you will have to be patient. Don't think that you will be full of health and strength because you have had a rich diet of vitamin A for a week. Nor should those who wish to keep their good health forget all about it, once the danger is passed.

But you will ask: "What food should I give my family in order to be sure that they are getting enough vitamin A?" Naturally, that depends on how much you are able to spend on meals. Foods rich in this vitamin are usually expensive. One consolation is that you can manage with less vitamin A if your meals are varied and rich in other vitamins. I should recommend that you eat only whole-wheat and rye bread, which is no more expensive than white bread. Bread is our principal food, and for that reason it is extremely important.

Vitamin A is found in the vegetable kingdom as well as in the animal kingdom. It is found in the sea, especially in the small green seaweeds. In plants, it exists particularly in the green parts, for instance, in cabbage, spinach, lettuce and green salads, green beans, and in everything green; in the yellow or yellow-red fruits, such as tomatoes; and in carrots. Vitamin A when found in plants is in the preliminary stage; in animals, it is transformed into the perfect state. Animals eat the plants containing the vitamin, which is deposited in the various organs, especially the liver, and in the milk. The proportion of vitamin A in animal foodstuffs varies greatly. It is especially high in summer, when the animals have an abundance of green fodder.

The principal foodstuffs which contain vitamin A are milk, cream, butter, and cheese. Vitamin A is found in cream, but not in skimmed milk or whey. It is also found in margarine which has been vitaminized, and in eggs, fish-roe, liver, kidneys, and other vital organs; to a lesser degree in meat, although not in pork; in the oily fishes, such as eels and herrings, in fish liver, and in cod-liver oil, which is the richest vitamin-A-containing food that we have.

It will be seen that it is not an easy task to provide one's family with vitamin A both in winter and summer. Vitamin A may be cooked, but it is destroyed when fatty foodstuffs are over-roasted.

It would certainly be to our great

advantage to consider cod-liver oil as a food and not just as a medicine. Healthy children during the growing age should be given daily a teaspoonful or the corresponding quantity of the oil in concentrated form, if they do not like the taste of the ordinary oil. Healthy children do not all need the same quantity of vitamin A. The need for vitamin A is increased during infectious illnesses. Sick and convalescent persons should have it abundantly in their diet, so that their powers of resistance are not still further reduced.

It is well to remember in planning meals for yourself and your family that it is important to include every day several foodstuffs containing vitamin A.

—HELGA FRANDSEN
Denmark

News of State Activities

THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Only brief and timely items can be used, because of the limitations of space.

[EDITOR'S NOTE: In order to conserve space, and since there has been a diminution in the reporting from local agencies, this Section will be published only twice during 1942.]

District of Columbia

"Junior League volunteers are again helping to promote a prevention of blindness program in the District of Columbia.

"Following a brief course of instruction by two ophthalmologists and the Director of the Society for the Prevention of Blindness, the volunteers are testing vision of little children in settlement houses and private nursery schools."

—*District of Columbia Society for the Prevention of Blindness, Washington, D. C.*

Illinois

"The Twenty-sixth Annual Meeting of the Illinois Society for the Prevention of Blindness was held at the Standard Club on Monday, November 17, at 12:15 P.M. About 300 people were there, including the Fiscal Director of the State, two members of the Legislature and representatives from the following agencies: Cook County Public Welfare Board, State Department of Public Instruction, Chicago Board of Education, Board of Welfare Commissioners, the *Chicago Daily News*, the *Chicago Tribune*, the W.P.A., and the Chicago Council of Social Agencies. There were also representatives from 9 hospitals in Chicago and about 20 private social agencies which co-operate with the Illinois Society for the Prevention of Blindness.

"The meeting was given over to the reading of the annual report of the Society, which described the following achievements:

"1. Not a single case of blindness from ophthalmia in Illinois this past year. This is the first time in three years that the Society could report this.

"2. The growth of sight-saving classes to 91 in the state.

"3. The progress in trachoma control, showing that it is over the peak and the project is now being reduced because most of the cases have been cured. There were only 16 stage one cases discovered during the year, in spite of exhaustive diagnostic clinic work.

"4. Transfer of the glaucoma clinic work from the Society to the State Department of Welfare.

"5. The opening up of a project with the Blind Relief Division of the Cook County Board of Public Welfare on restoration of vision.

"6. A complete report of the legislative results obtained by the Society at the last legislature, which included the passage of the Fireworks Bill, appropriations amounting to $389,000 for sight-saving, appropriations amounting to $76,000 for trachoma, and appropriations amounting to $8,400 for glaucoma work."

—Illinois Society for the Prevention of Blindness, Chicago, Illinois

Minnesota

"The Minnesota Society for the Prevention of Blindness and Conservation of Vision provided eye examinations for 4-H boys and girls at the State Fair in September. Seven ophthalmologists and 22 public health nurses participated in this clinic. Several formal and informal discussions have been held at the Central and Western Divisions of the Minnesota Educational Association and at meetings of county Public Health Associations. The State Society is working with several counties in their efforts to get public health nurses and to interest teachers in vision testing of school children, especially in the rural areas. The Minnesota State Medical Association is co-operating with this Society in conducting a survey of the eyes of school children in a selected county of Minnesota."

—Minnesota Society for the Prevention of Blindness and Conservation of Vision, St. Paul, Minnesota

Missouri

"Through the efforts of Dr. John McLeod of Kansas City, an educational exhibit on glaucoma was prepared. This was shown under the auspices of the Committee on Conservation of Eyesight of the Missouri State Medical Association at the meeting of the Southern Medical Association, and a unit of it was shown at the biennial conference of the National Society for the Prevention of Blindness in New York City."

—Committee on Conservation of Eyesight, Missouri State Medical Association, St. Louis, Missouri

Tennessee

"*Sight Conservation Activities in Tennessee from July 1 to November 1, 1941.*—In the continuation of the survey of the blind of the state, 190 new cases of total and partial blindness have been studied; 126 of these cases were persons examined for Aid to the Blind, their eye examinations being furnished the Service by the Department of Public Welfare, and the remaining 64 were office cases, of which 48 were children and 16 were adults. This brings the number of totally and partially blind persons studied to date, by the Service, to 3,720, of which number 649 are children, and the Service estimates that its survey of the blind of the state is now about 92 per cent completed. The important facts coming out of this study are: that 55 per cent of this group have a chance, varying from an excellent one to an outside one, to have sight restored to them, in whole or in part, in one or both eyes; that 66 per cent of this blindness might have been prevented if the proper preventive measures had been in existence or available; and that our blind population is showing an annual increase of between 92 and 137 persons.

"In August another visual corrective program for indigent visually handicapped children of Perry County was organized by the Service with the Linden Lions Club, and this program began operation in September, bringing the total of visual corrective programs established by the Service to 14, 9 being with Lions Clubs and 5 with other organizations, giving this type of service to 13 of the 95 counties of the state.

"During this four months period the Sight Conservation Service has been able to arrange one or more types of ophthalmological services for 141 persons, 118 being children and 23 being adults, the types of services rendered being: eye examinations—104; refractions—92; 11 treatments for trachoma for 3 persons; 4 treatments for marginal blepharitis for 2 persons; and treatment for one case of chronic conjunctivitis; 12 visual recheck examinations; an artificial eye each for 3 persons, 2 being children and one being an adult; and 14 surgical procedures, being as follows: 4 cataract extractions; 2 eye muscle operations; 2 extractions of a dislocated lens; and one operation each for glaucoma, entropion, an artificial pupil, a capsular membrane, pupillary membrane, and chalazion, for 13 of whom hospitalization has either been furnished or arranged for by the Service. Also, 77 pairs of glasses were furnished 77 persons, 68 being children and 9 being adults, and of this number other organizations and interested individuals furnished 53 pairs and the Sight Conservation Service furnished 24 pairs."

—*Sight Conservation Service, State Department of Public Health, Nashville, Tennessee*

Note and Comment

Proceedings of the National Society's Biennial Conference.—The National Society for the Prevention of Blindness is publishing a large part of its biennial conference proceedings in the current and forthcoming issues of the REVIEW. Those sections which are not appearing in the REVIEW will be published as supplements, which we are offering to REVIEW subscribers without charge. In general it is not planned to publish separately individual papers given during the conference, and those readers wishing the proceedings will be able to have them by purchasing the issues of the REVIEW in which the papers appear, and the supplements, which will be sold at a nominal charge. The current REVIEW is being offered free of charge to all new subscribers whose subscriptions will begin with the March, 1942, issue.

National Maternal and Child Health Council Releases New Manual.—Under the title, "Hidden Hungers in a Land of Plenty—A Handbook of Nutrition Projects for You and Your Group," is an attractive collection, prepared by the National Maternal and Child Health Council in co-operation with the American Red Cross, the American Dietetic Association, and the American Association of University Women, which has recently reached our desk. It describes briefly ways by which local communities may put into operation the recommendations of the National Nutrition Conference for Defense of May, 1941. Written in a lively manner, it should be of interest to any club or study group, as well as to those engaged in public health work. The handbook is available at the Council, 1710 Eye Street, N.W., Washington, D. C., for twenty-five cents, and the Council will welcome all comments and suggestions for improvement. The Council also releases lists of readings, pamphlets, posters and exhibits, and films, which are especially useful to those interested in maternal and child health teaching.

Syphilis and Gonorrhea Responsible for 17 Per Cent of Blindness.—Syphilis and gonorrhea are among the major destroyers of sight, and these diseases are responsible for approximately 17 per cent of blindness in the United States, it is pointed out by Mrs. Eleanor Brown Merrill, Executive Director, National Society for the Prevention of Blindness, in a statement urging widespread public observance of National Social Hygiene Day on February 4. She commented:

"There is a close relationship between prevention of blindness and the drive to stamp out syphilis and gonorrhea. Of the 200,000 blind persons in the United States, about 34,000 lost their sight as the result of these diseases.

"With our nation at war, the campaign against venereal disease, which is being carried on so ably by the United States Public Health Service and the American Social Hygiene Association, is more important than ever. This is now a matter of patriotism as well as humanitarianism and good economics.

"During this period, when victory depends on the speeding up of our industrial production, there is the danger of an increase in accidents among workmen in factories, shops and mills; and the eye hazards of industry, especially, are greater when workers are suffering from syphilis. The presence of this disease increases the severity of an eye injury; a little cut or bruise of the cornea, that would otherwise pass unnoticed, may develop into a serious condition if the worker has syphilis.

"To keep America strong we must take advantage of the scientific advances that can help us control venereal disease and safeguard eyesight."

Eye Injuries During Aid Raids in Great Britain.—A report in the April, 1941, issue of the *British Journal of Ophthalmology* on "Eye Injuries in Aid Raids," has become of special concern to us in the United States with our advent into the war. The facts discussed are significant, not only to those volunteering for civilian defense activities, but to every citizen living in locations which might be affected by air raids. The *Journal* reports that during one night in which there were intensive air raids, at one large hospital in London there were 280 corneal and conjunctival foreign bodies cases among members of the fire services between midnight and 5:30 A.M. Most of these foreign bodies were charred material. Most had been treated at first-aid stations by the instillation of castor oil drops and returned to their duties, but later had to be referred to the hospital. It was found that the pad which was put on after treatment at the hospital was not kept on; therefore, this was discontinued.

Eye injuries caused by flying glass have been very common. Glasses with shatterproof lenses are recommended for those in the less active air raid duties. As the writer comments that, the greater the strain under which people work the less they are willing to

adopt devices for ocular protection, this apparently is the reason why goggles are not recommended for those in the active air raid services. The pasting of windows with net or their occlusion with wooden shutters is recommended for the protection of those sheltering in houses.

Apropos of the danger to the individual not exerting the utmost safety precautions, Lord Beaverbrook recently told the House of Lords about a noted scientist who pursued his work very diligently. During a heavy raid on London he got out of bed and remained the whole time at a window watching to see what might be the effects of the exploding bombs. Unfortunately, one of the explosions resulted in the loss of his eyesight, although there is some possibility of its being restored.

New Fellowships in Nutrition.—With the growing interest in the effect of diet on eye health, as well as general health, the announcement by Swift and Company of the establishment of a series of fellowships for research in nutrition is of especial interest. Intended to aid the federal government in its long-range national nutrition program, the fellowships provide for special research to be undertaken in laboratories of universities and medical schools with funds which the company has set aside as grants in aid. Any fundamental study of the nutritive properties of foods or the application of such information to the improvement of the American diet and health will be eligible for consideration for a grant. Each fellowship will be for one year, unless renewed, and will be granted in an amount proportionate with the scope of the project.

Correction Re Testing for Color Blindness.—The last issue of the REVIEW carried a News Note stating that the U. S. Army has discarded both the Ishihara and Stilling charts for testing color blindness. Major L. L. Gardner, Medical Corps, Assistant, of the Office of the Surgeon General, has written us: "May I advise you that the above information is not entirely correct? Whereas the Holmgren yarn test is used to reveal the subject's ability to recognize differences in clearly defined shades of colors, it has not supplanted the pseudo-isochromatic color plates for more precise determinations. These latter materials continue to be items of Medical Department issue and are widely used in the testing of color vision."

Book Reviews

EYE HAZARDS IN INDUSTRY. Louis Resnick. New York: Published for the National Society for the Prevention of Blindness by Columbia University Press, 1941. 321 p.

Impressive and most convincing are the reasons given by the late Louis Resnick for his book on eye hazards in industry.

At the end of every eight-hour work day, 1,000 men and women in American factories and other workplaces will have suffered eye injuries: their eyes pierced, ripped, and crushed by flying fragments; burned by acids, caustics, white-hot molten metal, and the rays of the welding torch; or dimmed by exposure to poisonous substances.

At the end of a year, 300,000 eye injuries occur in our national industries. The cost is more than $100,000,000. The effect of lost production hours on both normal and defense production is of staggering proportions. The stark tragedy of the blind is indescribable; and finally, *the great majority of these eye injuries are preventable.*

There, in a nutshell, are the author's reasons for his excellent and timely volume.

Quite properly, he states the problem in Part I before dealing with its solution, and in so doing provides an amazingly comprehensive array of factual data that are valuable and necessary in approaching the major objective of eye conservation.

The frequency and cost of industrial eye injuries are treated extensively. The text shows where and how these injuries occur. Traumatic injury, eye diseases, defective vision, illumination, and first aid are covered in ample detail.

A most interesting feature is the author's treatment of the insufficiently recognized hazard to eyes that arises from the exposure of persons to industrial poisons. Indeed, the complacent individual who believes that eyes need only to be protected against flying materials and flashes should prepare for a shock when reading the author's material on sources and causes of injury.

Of greatest value are the chapters on mechanical guards, process revision, proper lighting, education, and administrative supervision, in Part II. Here will be found the solution to the common problems and, in fact, many of the uncommon problems that are created

by industrial eye accidents and injuries. The employer and his managerial and supervisory staffs, the safety engineer, instructor, or student, and the interested individual workman will profit by reading this section.

One is impressed not only by the straightforward, able and practical manner in which the entire subject is considered, but also by the very evident sincerity of purpose of the author. Consistently he sticks to his text, notwithstanding the temptation to wander into the field of general accident prevention. Nor does he permit the element of commercialism to color the text in any way.

The book is replete with tables, lists, examples, and illustrations. Appendix II lists industrial poisons which are hazardous to the eyes, also symptoms, conditions and diseases, and types of workman exposed. Recommended illumination standards are listed in detail in Appendix III.

Especially thorough is the treatment of mechanical guarding and process revision on which the author pins his faith as unequalled means, for the present at least, of preventing injuries to the eye.

The reader is left aghast at the magnitude of the problem created by industrial eye hazards, amazed at the wealth of information available for its solution, convinced of the need for more effective action, inspired and enthused.

Eye Hazards in Industry is a timely aid to the current drive on production for national defense. It should serve further to prevent the unnecessary wastage of both the human and material resources of the nation in periods of normal industry as well as in emergencies.

Its arrangement is well suited to textbook and reference purposes and is of especial value to those persons who have the responsibility for initiating and directing the work of protecting the workmen of industry against accidental injury.

—H. W. HEINRICH

A TEXTBOOK OF OPHTHALMOLOGY. Sanford R. Gifford, M.D. Second Edition. Philadelphia: W. B. Saunders Company, 1941. 470 p.

This textbook serves well the purpose for which it was written, namely, to instruct the medical student and the general practitioner in the fundamental aspects of ophthalmology. The first edition was fine, but the second edition, with its revisions in modern therapeutics, such as the use of sulfanilamide, heparin, thiamin chloride, etc., in eye conditions, brings to the general medical world a book that is up-to-date, not only in the medical aspects of ocular disease, but also in the treatment of such conditions.

There are numerous plates, both colored and black and white, which illustrate the written text. These are well done.

Dr. Gifford's judgment is well seasoned by his vast experience as a clinician, teacher, and research worker.

—GEORGIANA D. THEOBALD, M.D.

SAFETY EDUCATION. Eighteenth Yearbook of the American Association of School Administrators. Washington, D. C.: National Education Association, 1940. 544 p. ill.

The fact that the American Association of School Administrators has published a yearbook on safety education is significant. There was one other presentation by a national education group; it was made in 1926 by the National Society for the Study of Education. Study by the school administrators indicates that the newcomer, safety education, has been accepted by the leaders in education as a part of the education program.

Safety Education was prepared by a commission composed of nine men. Two members have been identified with the safety movement. The other seven members are from various school systems, some of which have made contributions to the safety movement by the intensive programs of their cities. All are capable executives. The committee represents a range of experience, although the actual contact with safety education could be considered limited in some instances.

The first two chapters are general in nature. They set the guideposts for safety education by stating clearly the philosophy of safety education. They are well written. They impress the reader

with the school's responsibility in preparing young persons to live with reasonable safety in the modern world. Young persons are to be taught safety so that they may enjoy life more fully. In giving youngsters this safety program, the schools are developing character and personality as by-products.

Four chapters are given to a consideration of safety education in elementary and secondary schools. The responsibility of the school is fully outlined. Careful planning and adequate leadership are stressed.

The chapter on secondary schools delineates the need for a general safety education program at this level. It states that, for the most part, safety education in secondary schools is at the experimental stage.

The suggestions given to the discussion of school safety (two chapters) are good. Data regarding school accidents are cleverly given in pictorial graphs. The gymnasium is evidently the most dangerous place, but no explanation is given.

The chapter dealing with safe school buildings is helpful, but is limited for space. This topic might well be selected for further study by this group. School procedure for safety, *i. e.*, the best use of equipment, should be closely related, but receives no attention.

The chapter, "Co-ordination of Safety Programs," is good in that it recognizes that the school program is only one phase in the education of children. If child life is to be safe, many agencies must cooperate. It is well for the schools and the community as a whole to keep this viewpoint.

The Appendix gives a good list of free and low cost materials. A clear explanation of the Standard Accident Reporting System is given.

This book should stimulate school administrators to evaluate safety education programs in the systems for which they are responsible. While traffic safety has received undue emphasis in this book, it must be admitted that there is more available material on traffic safety than any other type. Perhaps one woman on the committee would have been desirable!

—MARY MAY WYMAN

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

364. Sight-Saving, A Co-operative Movement, Ben A. Sylla. 8 p. 5 cts. A school superintendent discusses the organization, administration, and instructional program of a sight-saving class. Reprinted from the *Sight-Saving Class Exchange*, No. 78, November, 1941.

365. Sight Conservation on the Advancing Fronts of Public Health and Nutrition, Frank G. Boudreau, M.D. 12 p. 10 cts. Discusses advances in public health and the effect on prevention of blindness.

366. Eye Defects Discovered Through Selective Service Examinations, Arno E. Town, M.D. 8 p. 5 cts. Discussion and analysis of defects found, and suggestions for their remediation.

367. Saving Sight in the Young Adult Through Social Service, Ophelia Settle Egypt. 12 p. 10 cts. Indicates how the various social services contribute to the solution of the general problem of conservation of sight.

368. Prenatal Factors as Causes of Blindness, Leona Baumgartner, M.D. 16 p. 10 cts. Discusses prevalence of blindness associated with pregnancy and birth, and prenatal conditions affecting the eyesight of the offspring.

369. Heredity in Relation to Blindness and Its Prevention, Morton D. Schweitzer. 4 p. ($1.60 per C; $14.00 per M.) Describes some of the hereditary diseases which are known to lead to serious impairment of vision.

370. Chronic Glaucoma, C. Gregory Barer, M.D. 12 p. 5 cts. Discusses incidence, symptoms and signs, methods of detecting and treatment of glaucoma. Prepared for the general practitioner.

371. The Eye in Aviation, Dorf Bean, M.D. 8 p. 5 cts. Describes the different steps in the eye examination for pilots and cites the visual requirements for other fliers.

372. Nutrition and Sight, Helga Frandsen. 8 p. 5 cts. Presents the effect of vitamin deficiency on eyesight.

D149. The General Practitioner's Part in the Campaign for the Prevention of Blindness from Glaucoma, Mark J. Schoenberg, M.D. 4 p. ($1.00 per C; $7.50 per M.) Reprinted from the *New York State Journal of Medicine*, November 15, 1941.

D150. Meeting the Needs of Atypical Children, Doris D. Klaussen and Georgia Rothberg, R.N. 6 p. ($1.75 per C; $15.00 per M.) Description of the work at the Ann J. Kellogg School. Reprinted from *Public Health Nursing*, September, 1941.

D151. Glaucoma Survey, Derrick Vail, M.D. 1 p. Editorial describing the scope of the Society's glaucoma committee. Reprinted from the *American Journal of Ophthalmology*, October, 1941.

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